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**RESULTS OF AN EXPEDITION TO THE
CENTRAL ANDES***

UNDER THE AUSPICES OF THE AMERICAN GEOGRAPHICAL SOCIETY

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The three distinctive physiographic features of the Central Andes are a chain of interior basins with many salt lakes and vast marshy salars, the broadest and loftiest plateaus in the entire Andean Cordillera, and one of the few really great volcanic fields of the earth. In addition, a steep descent—a well-dissected fault scarp—defines the eastern margin, and a long barren coastal desert lies on the west. In the field of human geography the Central Andes form one of the most important groups of natural regions in the world. It is impossible to find elsewhere in South America an area of equal size with so great a variety of life. The density of population ranges from 100 to the square mile in the vicinity of Cochabamba, Bolivia, to $\frac{1}{10}$ to the square mile in the Territorio de los Andes, Argentina. Occupations run from the intensive agriculture of irrigated valleys to the pastoral nomadism of Alpine meadows; customs, from those of modern civilized people to those that bespeak an unmixed barbarism.

It is this extremely wide range in the physical conditions of the Central Andes that excites the interest of the geographer. The principles of geographic science rest upon the theory that man is to an important degree the product of the earth. In the varied physical environment of this great tract we should therefore expect

* "The Central Andes" is a proposed name for a group of closely related natural regions that lie between 12° and 26° south latitude.

climate and relief to exercise a high degree of influence upon the population. A study of its people should demonstrate both the scientific nature of geography and the wide application of its laws. Where then are the deserts, the vast river-threaded forests, the bleak tablelands, and barren mountain valleys? And what of man living under the stern conditions that these names imply? What is his life, his government, his character?

These considerations led me to undertake a line of work in South America that was begun in 1907¹, carried forward in 1911², and completed in 1913³. Notices and papers relating to the work of the first two expeditions have appeared in this *Bulletin*. It is proposed here to outline the principal results of the work of 1913. A preliminary note from the field appeared in the *Bulletin* for October, 1913. Later papers will deal with special problems; and the final results of the 1907 and 1913 expeditions will ultimately appear in book form. My warmest thanks are due the American Geographical Society for aid, without which it would have been impossible to complete the original plans. The generous spirit in which funds were appropriated is proof of the lively interest the Society is taking in field work as a basis of research.

In the account that follows I shall not attempt to give a narrative of the Expedition but shall leave that to the more extended treatment possible in the preparation of the final results; nor shall I include a complete account of the problems that were investigated. Thus little or nothing is said of the interesting physiography of the La Poma valley; the life of the Chaco territory; El Bramador, the roaring mountain of Toledo; geographic influences in the history of the early mining industry of Copiapó; the transmontane cattle trade and the effect of the rapidly changing trade routes of western Bolivia upon the fortunes of the highland people. It seems rather more appropriate briefly to outline a small number of leading problems.

THE EASTERN BORDER REGION

In the course of two earlier journeys to the Central Andes I had become acquainted with northern Chile, western Bolivia, and southern Peru. The field work in 1913 was therefore carried into northwestern Argentina where terminates the great chain of interior basins that occupy depressions in the central plateau. It

¹ The Yale South American Expedition of 1907.

² As part of the work of the Yale Peruvian Expedition of 1911.

³ Expedition to the Central Andes, under the auspices of the American Geographical Society of New York.



FIG. 1—Topography and vegetation at 10,000 feet, La Poma region, northwestern Argentina, lat. 26° S. Here occurs a valley desert where aridity combines with strong erosion to limit the amount of available water. Several thousand feet lower is the forest zone; several thousand feet higher are the grasslands of the Alpine country.



FIG. 2—Denser stands of timber in the forest zone that marks the belt of maximum precipitation above Rosario de Lerma, northwestern Argentina, 4,000-5,000 feet.



FIG. 3—Grass-thatched hut of a mountain shepherd, two days' journey west of Puno. *Ichu* grass in the foreground.

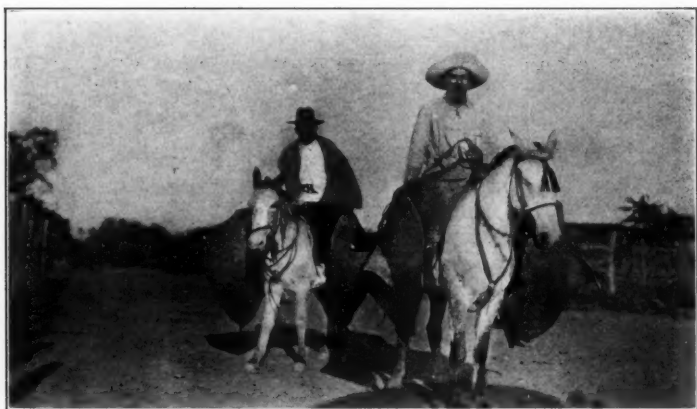


FIG. 4—Gauchos of the Chaco at Embarcacion, northern Argentina. The heavy cowhide flaps on the saddle front are a protection against the thorny shrubs through which the cowboy must ride in rounding up his stock for the long drive to the end of the railway.

is here also that the climate of the Central Andes is most extreme. The summer (January) sun raises the temperature to a high degree; the dust storms of midday hours give place at night to calms, and, in the clear skies of the horse latitudes in which the district lies, the thin air radiates its heat so rapidly as to fall below the freezing point. In winter, even the daytime temperatures do not rise above 35° to 55° F., and the night temperatures frequently fall below 0°F. The rainfall varies from ten to twenty inches on the eastern margin of the mountains to two inches in the driest parts of the Puna de Atacama. In the extreme climates of a region so broken and lofty the distribution and character of the population show striking responses to geographic conditions.

We found the zone of maximum precipitation on the mountains west of Salta to be marked by a belt of temperate forest between 4,500 and 6,000 feet. Above the forest, scattered groves occur in favorable places and belts of timber extend up the shadier and moister valley floors. The higher country bears a thin cover of herbaceous vegetation which gradually changes to the scattered clumps of *ichu* grass at the highest elevations. Up to 9,000 feet barley is grown; above that elevation potatoes are the chief vegetable product. The grasslands are the seat of pastoral population groups. In the forest, agriculture and grazing are combined. Below the forest a more intensive agriculture is practiced with irrigation. Those streams that have their chief tributaries in the forest belt are most constant in flow and furnish to the population groups on the mountain border the means for agriculture and stock raising on a large scale.

The variety of life on the eastern flanks of the Cordillera, due to the varied climate and resources that we have briefly sketched, is exhibited in a comparatively narrow zone owing to the abrupt nature of the mountain border. In a few days one may ride from the warm valleys at 4,000 feet to the bleak passes in the bordering ranges at 16,000 feet, crossing successively the belt of irrigation, the belt of forest and woodland, the belt of grasses, and the belt of barren mountain slopes and rock slides. It is but natural that there should be an intimate degree of intercourse between the people of these unlike regions. The wool and skins of the mountain shepherds are carried down by pack train to the railroad at Rosario de Lerma (thirty miles southwest of Salta); in the belt of forest besides vegetable growing ("habas", beans, potatoes, etc.) wood-cutting is a regular occupation for a limited number, to supply timber and fuel to the mines and firewood and building material

to the towns. The irrigated valley lands support herds of cattle and droves of mules for the transmontane trade with the nitrate country in the Desert of Atacama. So large and profitable is the trade since the fuller development of the nitrate industry that land values have risen enormously. Many families once poor land owners are now rich city dwellers. This is a phenomenon now common to the eastern agricultural provinces of Argentina but it is of recent development in the mountain provinces and in some cases is due to quite different stimuli: the railroad, the growing nitrate industry in Chile, the more rapid development of mining since the introduction of the railroad, and a host of minor causes.

Because it is the capital of the province in which these economic changes have been most marked Salta has been transformed in the last ten years. From a mountain village it has developed into a fair-sized city. Its people were once untraveled and its streets filled with pack trains bearing supplies that were in large part bartered rather than sold. Even its merchandise had only a few decades ago come largely from across the Cordillera, where Chilean railroads gave easier access to large commercial routes. Now it has a street-car line, big business houses, at least four large banks, and a considerable number of really modern homes. He who has visited Europe is no longer pointed out as a distinguished person. The dresses of the women are nearly as modern as may be seen on the streets of New York. One of the most elegant club houses in Argentina faces the well-kept plaza. The life of the people in a score of ways has taken on a degree of comfort and luxury hitherto almost unknown.

It is not possible to give within the limits of this short paper more than the briefest account of the work on the western border of the Argentine Chaco. It is here that cattle are gathered for shipment to the valley pastures at Salta and other districts on the west. From the railroad terminal at Embarcacion long lines of two-wheeled carts carry supplies northward to the Argentine-Bolivian border towns along the base of the mountains and to the oil fields at Cueva, Bolivia. A feeble down-stream trade by means of temporary rafts is carried on with the river villages below the Bermejo crossing. Through the terminal also come groups of Matacos Indians who spend part of their time on the sugar estates now developing rapidly on the plains along the border of the mountains. In oil, sugar, and cattle, we have examples of resources that are of much wider interest than the hides, feathers, wool, and grains for which the region was formerly known. It will therefore be



FIG. 5.—The borax basin of Pastos Grandes, northwestern Argentina. In the background are lava flows. The white deposit is borax broken here and there by open water. The central hummocky ridge which separates the two parts of the basin is composed of basin sediments, finely stratified, thrown into low folds, and with a strong regional inclination toward the center of the present basin. The relations are typical of the three main basins along our route.



FIG. 6—Winter camp of mountain shepherds at Aguas Blancas near Soncor, Desert of Atacama, 9,000 feet. In the background is the great Salar de Atacama, the largest salt plain in South America.



FIG. 7—Oasis of Soncor, western border of the Maritime Cordillera, Chile, where a small mountain stream terminates near the edge of the Desert of Atacama.

seen that the geographic importance of the region on the common border of mountains and plains in northern Argentina depends not only upon minor products of local value but also upon commodities that enter into national and even international trade.

THE PUNA DE ATACAMA

The physiographic studies which I have been able to carry out along five different routes running from one side of the Central Andes to the other make it possible to conclude that the whole region has suffered great uplift in relatively recent geologic time. In the Tertiary and early Pleistocene, uplift by at least 5,000 to 7,000 feet carried to its present elevation a relatively low-lying tract bordered by mountains of only moderate boldness. Were it not for the topographic irregularities caused by the volcanic eruptions of the period of uplift the mountains would be smooth-contoured, rounded, subdued. Their present ruggedness is due less to the great uplifts they have suffered and the dissection now in progress than to the volcanic cones and ragged lava flows built upon them.

The Puna de Atacama clearly exhibits this three-fold topographic complexity. It consists of a series of interior basins of great aggregate extent shut off on either hand from the Pacific and Atlantic drainage and also in general from each other by volcanic masses. Were one able to remove the volcanic material there would be revealed an older series of rocks on the one hand very complex as to structure and on the other very simple as to topography. Old schists, slates, limestones, and younger intruded granites, are faulted, folded, and mashed to such an extent that a detailed description of their structure would be hardly more than a long catalogue of facts. Few generalizations can be made save that the main structural lines trend with the topographic lines of the mountains. This implies repeated movements along established planes of fracture, repeated stresses along somewhat permanent axes, and at least some genetic relation between lines of fracture and folding and those recent volcanic outbursts that have increased the height and ruggedness of the mountains. Before the period of volcanic activity had set in, the topography had ceased in large measure strongly to reflect the structure. Erosion had been so long continued that the rugged forms of a youthful landscape had become the subdued forms of a late-mature landscape. Where volcanic material is absent as in the Pre-Cordillera, northeast of Tucuman, and in the ranges between Rosario de Lerma and La Poma, the older topography stands out in marvellous contrast to

the ragged border of the sierras crowned by roughened volcanic material and cut into a labyrinth of spurs and canyons by a multitude of streams.

A high degree of interest surrounds the physiographic problems of the Puna because of the stage in the arid cycle that the topography had reached before the main volcanic period had opened. As we have just seen, mature forms were developed upon an older surface of erosion. Therefore in the pre-volcanic epoch, the basins must have had a greater degree of organization than they display in the present youthful stage of the current cycle. To say that their borders were worn down is to imply that their floors were built up with the waste derived from the eroded borders. If the basins stood at different levels the higher might have been filled up and become tributary to the lower and even the lower basins might ultimately have gained access to the sea. How far was this process carried? We know that there were interior basins in a dry climate before the volcanic epoch opened because locally developed sediments containing salt deposits are now visible on the margins of some of the existing basins. They are flexed upon the borders and thrown into low folds or faulted farther out; dissected on the borders and buried toward the center of the existing basins. These sediments are not coarse, irregular, local, alluvial-fan deposits like those that in part overlie them and that are in process of formation. They are even-bedded and extensive. They denote quieter and more gradual accumulation from an upland border well-advanced in the cycle of erosion. Furthermore, it is reasonable to infer that they overlie coarser deposits that were formed in the youthful stage of the cycle.

Whether the deposits of neighboring basins coalesced across the low divides or became at last interdependent it is not yet possible to say. It seems a fair inference, however, that they did. In even the present youthful basins there is a certain degree of coalescence of bordering waste deposits as between Quiron and Rincon (lat. 25° S). The basin of Huaitiquina now discharges into the Salar de Chanchari and the Susquez basin by the river Burras into Salar Grande. There are also a considerable number of minor basins in which the same condition has been attained. If this degree of coalescence has been gained in the youthful stage of the present cycle it is reasonable to infer that the basins had a much higher degree of organization in the mature stage of the preceding cycle. Soft forms, moderate gradients, and waste accumulation to a thickness of at least a mile on the border of the Cordillera



FIG. 8—Oasis of Toconao. Volcanoes of the Maritime Cordillera in background. One of the trails of the mountain shepherds may be seen as a white line leading from the oasis toward the mountains. Toconao is famous for its fruits and also for its good water, which is carried in pack buckets to San Pedro de Atacama, a day's journey toward the north.



FIG. 9—Temporary habitation of poles and branches on the border of the oasis of San Pedro de Atacama, used by mountain shepherds on trading journeys to the oasis.

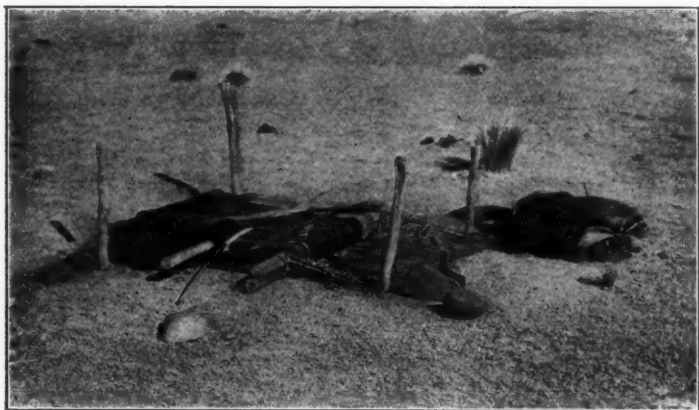


FIG. 10—Blanket weaving among the highland people.



FIG. 11—The dune country on the border of the Desert of Atacama.

were achieved during the main cycle of erosion; it must therefore be concluded that basin integration was well advanced since the leveling action of desert processes fill up basin floors and thus raise the local base levels at the same time that the basin borders are graded and reduced in height.

In the Titicaca-Poopó basin on the north we have some suggestion of the state reached by the southern group of basins. Lake Titicaca discharges into Lake Poopó through the Desaguadero river. Poopó in turn discharges intermittently into the Salar of Aullagas. Between this and a number of other large adjacent salars there is now intimate connection. Though rock masses are distributed here and there through the group of basins, they no longer form continuous divides. They are either remnants of former more extensive ridges now partly buried, partly eroded, or volcanic masses of recent origin. In this region volcanic action was confined chiefly to the Western or Maritime Cordillera; it did not, as in the Puna de Atacama, affect the whole central basin region and obscure the earlier topography.

The light that the northern group of basins throws on the southern group is the clearer since the same stage in the erosion cycle had been reached by both. Mature forms everywhere characterize the borders of the Titicaca-Poopó basins save where volcanic material has been built upon the older surface. Long waste slopes, in complete organization with those cut upon rock, lead down by gentle gradients to the borders of the salars. Basin filling and integration are here in an advanced stage. It is conceivable that in the northern group less work had to be done to accomplish a given result. Were the basins less effectively separated from each other than those in Argentina to begin with? We can answer this question only in part. The Puna de Atacama is now a great highland with a general elevation that is quite uniform in spite of the volcanic material irregularly disposed upon it. From this I infer volcanic action to have affected less the regional elevation than the form and size of the local basins.

That the country was not built up to a general level by volcanic flows of a high degree of fluidity is shown by the fact that the older rocks, eroded to moderate gradients and marked by rounded forms, outcrop in many places and the volcanic flows are gathered rather closely about the volcanic vents. Uniformity of elevation may therefore be ascribed to moderately uniform reduction to a common level in the pre-volcanic erosion cycle. If we now consider the fine character of the earlier basin deposits it would seem

that the basins in which they were formed were more extensive than they are today. But, as we have seen, great extent and uniform elevation of basins are also characteristics of the Titicaca-Poopó region. We may therefore safely conclude that the forms and relations of the Titicaca-Poopó group of basins indicate in a general way the topographic and drainage conditions of the Puna de Atacama before volcanic material had covered a large part of the region, masked much of the older topography, and altered the size and limits of the interior basins.

THE PASTORAL NOMADS OF THE DESERT

The lofty Puna de Atacama lies between 23° and 26° south latitude where in June the sun's noon altitude is only 45°. Unlike the northern basin region and the Andes of Peru, the Puna has a protracted winter season marked by high winds, very low temperatures, and occasional blizzards. In our coldest camp on the night of June 22, the temperature fell to -4° F. On June 25 we rode from 4 o'clock in the morning until daybreak in a temperature that dropped steadily from +6° to 0° F. When the wind blows the cold is extremely trying inasmuch as the altitude prevents hard exercise that results in brisk circulation and a higher degree of resistance. In crossing the last pass in the Maritime Cordillera on the trail leading down to Soncor, south of San Pedro de Atacama, we rode into a wind that occasionally blew at gale strength with the temperature ranging between 7° and 45° F. In the great storm of July, 1911, a number of chinchilla hunters and cattle drivers lost their lives; and over seventy-five cattle perished at Agua Caliente (14,500 feet) on the way between the plains of Argentina and the nitrate desert of northern Chile.

Once every few years even at San Pedro de Atacama (8,000 feet) crops planted in August and September are frost-killed in December and the fields must be replanted. Though snow is a rarity in the desert it fell in 1911 down to 8,000 feet. In the oases it covered orange trees, vegetable gardens, and grain fields and effected a glory that was as novel as it was short-lived. It covered the mud huts thatched with grain-straw mixed with earth, and on melting germinated the seed, so that more than one householder grew a small crop of wheat and barley on his roof!

The extreme dryness of the region is one of its saving qualities for it limits the amount of snowfall. Were the region only a little moister the snowfall would be greater and in seasons of bitter cold the combined snow cover and low temperatures would make it not



FIG. 12—Photograph of a mirage on a sand dune, west face of El Bramador, the roaring mountain of Toledo, near Copiapó. The camera is inclined downward at an angle of 30° . The mirage shows as a slightly darker band $\frac{1}{16}$ of an inch wide, $1\frac{1}{4}$ inches long, and $\frac{13}{16}$ of an inch from the bottom margin. In a good print it appears like a shallow pond on a plain of sand.



FIG. 13—A chinchilla farm on the ranch of Sir John Murray at Vallenar, Chile. The original stock of 500 has increased to 2,000. The stone mounds are artificial. A corrugated iron and wire-net fence keeps them from escaping.



FIG. 14—Deck of the French freighter *Ville du Havre*, Lamport and Holt Line, showing vegetables in transit from the Huasco Valley to the nitrate ports. Coming south she carries vegetables to the desert ports from Arica which is supplied from the irrigated oasis of Tacna.

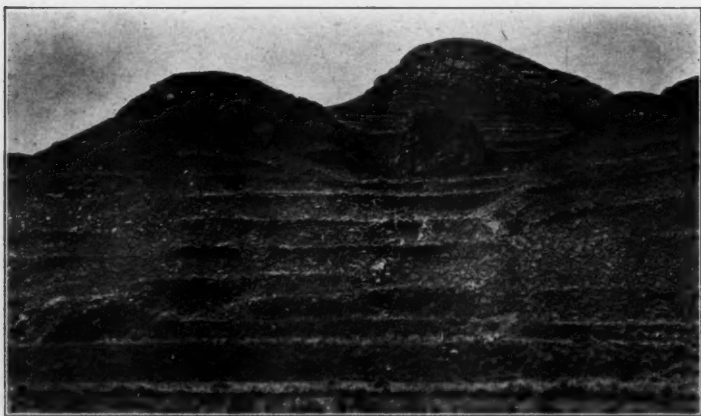


FIG. 15—Abandoned artificial terraces, called *andenes*, in the Cayrani Valley, a day's journey west of Puno, Lake Titicaca. Here once lived a much denser population, but the decrease is not due to a change in the productivity of the land or to a diminished rainfall. The population was drawn off in earlier years to the silver mines nearby and in later years to the towns and to the estates of the landed proprietors.

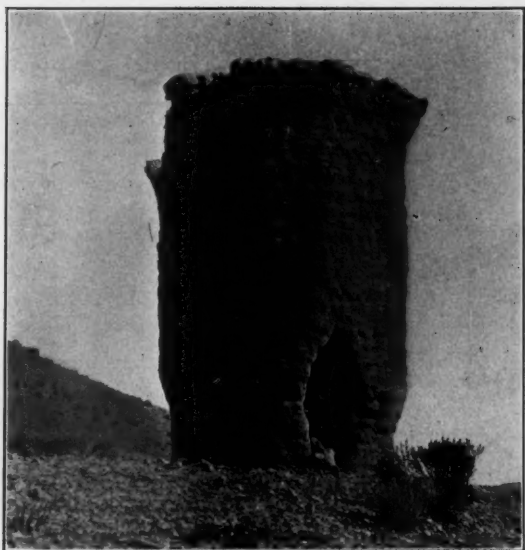


FIG. 16—Ancient chullpa in the Desaguadero Valley near Fairweather Gap. The thin partings represent layers of tough grass, bent back on the inside toward the outer face so as to give a smooth interior. The top is flat on the outside but dome-shaped inside. Under the floor are the skeletons of the former inhabitants. The door is about six feet high. The chullpa dwellings are no longer inhabited.



FIG. 17—Petroglyph near San Pedro de Atacama, exhibiting a chinchilla skin and llamas cut into sandstone.



FIG. 18—Petroglyph in the making, near Piedra Blanca, west of La Poma, elevation 13,000 feet. The outlines of llamas may be clearly seen; likewise the zigzag pattern of a snake as well as symbols whose meaning is not clear. The notebook is eight inches long.



FIG. 19—Indians towing the Expedition's flat-bottomed, shallow-draught boat, below the limit of steamer navigation, Desaguadero River.

only uninhabitable but also untraversable. Except for intervals of a few weeks in times of storm, mails are carried across the mountains by "mule express" in six days and nights between La Poma in the Argentine and San Pedro de Atacama in Chile. No mail whatever could be carried if the snow cover were of notably longer duration.

Instead of the fixed climatic conditions of the trade-wind belt in the northern Central Andes we have here a zone where alternately trades and horse-latitudes hold sway. The balmy days of "El Verano de San Juan" in June or the calm weather of a few weeks in summer are rare exceptions. More common are the high and bitter winds of winter that drive the traveler to sheltering angles in the canyon wall or behind every stone large enough to protect his body. In summer the wind raises great clouds of dust which are almost as fatiguing as the low temperatures of winter.

One of the most important results of the dry Puna climate is the great distance between springs and streams, commonly 30 to 40 miles. Where seepage water from a large area gathers on a valley floor of limited extent useful grass may grow, but in the great expanses between seepage lines and springs there are only useless shrubs and ground moss. In the northern Central Andes, every part of a mountain valley yields something useful to farmer or shepherd. In the Puna there are no pastures on the loftier pampas. Only from 11,000-13,000 feet where clouds gather in winter and where summer rains are most frequent is there a belt of pasture, called *pajonal*—delicate green in summer and light yellow in winter—that may be seen from far across the bordering desert on the west. Below this belt, as above it, there is nothing of value to farmer or shepherd except where some mountain stream sinks into the coarse alluvium of the piedmont plain. When the shepherd is driven from the upper *pajonales* he has little choice of places to go. The desert oases may be crowded but there his flock must ultimately be driven. The sole though temporary alternative is to seek out the neglected spots where tiny springs water a narrow ribbon of green. There his flock flits from one clump of shrubbery to another or gathers in greedy rings about rare hummocks of grass.

The mountain shepherds are stunted in mental development by the harsh climate and slender resources of their cold valleys and high pampas. Otherwise we might expect an armed contest for food between the oasis dweller and the mountain shepherd. Actually we find that there is the closest and friendliest relation. The causes for this condition lie not only in the mentality of the Indian;

it lies also in the geographic distribution of his principal natural resources. The oases on the western border of the Cordillera are for the most part mere dots in a vast desert. Miles of almost naked lava separate them from the belt of mountain pastures. Miles of hot sandy piedmont separate them from each other. In the absolute desert about them their own flocks, had they any, would find subsistence for only a part of the year. Hence the small size and scattered distribution of the oases make them quite as dependent on the flocks of the shepherds as the shepherds are dependent upon the vegetable food of the oases. Indeed, this supplementary relation is carried so far in the case of the smaller oases that they are merely the winter camps for the mountain shepherds who have their own gardens which they leave to the care of the old and infirm during the greater part of the year. At Tilamonte a few patches of land are planted, then left to the care of wind and sun until the harvest is due. Above Toconao the villagers each year go up to a line of tiny springs to cultivate a few additional acres. Almost the whole population of Soncor and Socaire are in the mountains in summer, leaving windows and doors barred and gardens cared for by the feeble who are left behind.

Along the line of a single valley like beads upon a string are the scattered plots of precious watered land. Between them there may be nothing but gravel-strewn stretches of valley flat. Hence it is natural that each cultivated tract should be known under a different name and give its name to a part of the valley. The best illustration is to be found in the valley of Rio Atacama. The town of San Pedro de Atacama has about 500 people but all about it (and to the inexperienced traveler they appear a part of it) are scattered groups of families and little villages. All told they raise the population of the district to 2,000. On the maps the name of San Pedro de Atacama is applied to the whole collection of groups. Among the Indians each group has a distinct name and even the central part is not called San Pedro but *Conde Duque*. For two leagues above this nucleus are small cultivated tracts, Cuchaloache, Catarpe, Tambillo, Silo, and Quito where fruit is grown. Extending to a point three or four leagues below are Sólár, Larache, Yaye, Pácsar, Chécar, Séquitor, Coyo, Tului, Beter, Poconche, Solcór and Cúenter on a ridge of sand, and Tevinguicha on the border of a brackish swamp due to seepage from the piedmont deposits. Each village represents some natural advantage. Here a group of algarrobo trees feed on the ground water and supply an abundance of



FIG. 20—Uros Indians in reed boats in the Totoral or great Desaguadero reed swamp, south of Lake Titicaca. The boats are propelled with long, slender poles brought from the forests on the eastern border of the Andes.

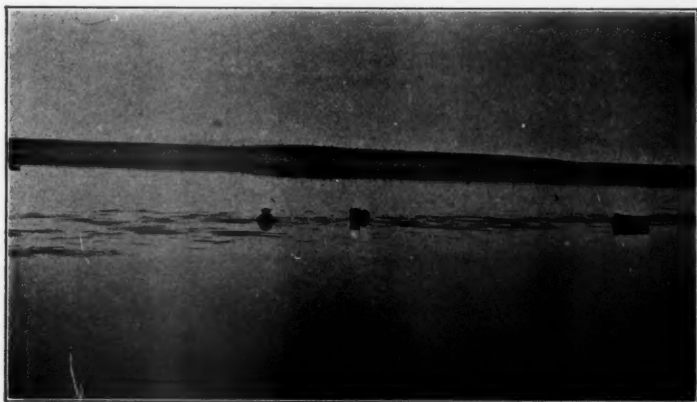


FIG. 21—Cattle feeding on the green, succulent water grasses in El Totoral swamp, Desaguadero Valley



FIG. 22—Uros Indian woman grinding millet in a goatskin. The grinding stone has been brought from a rock outcrop several miles away. The sack contains llama dung, called *taquia*, and used as fuel. The reed thatch of the mud hut is secured by grass ropes fastened to pegs in the wall.



FIG. 23—Uros Indian making a reed canoe on the border of the great reed swamp of the Desaguadero, fifteen miles south of Lake Titicaca. The rope with which he is binding the reed bundle is made of grass. Note the cattle far out in the swamp in the background.

algarroba fruit. There a clump of chañar trees supplies nuts for the delectable chañar meal. On the edge of the swamp of Tevinguiche is pasture to be rented to the cattle drivers from across the Sierra. The soil is sandy at Cúcuter but it also has no harmful salts and if watered but twice a year yields good crops. At Catarpe are warm terraces easy to irrigate, hence beautiful fruit orchards.

San Pedro de Atacama is a city of arrieros (muleteers). Unlike its tiny neighbors it draws upon outside resources. The additional population which it supports requires food in amounts greater than the land can yield. Its wants are more varied. Through it also flows a commerce between the mountain peoples and the outside world. At San Pedro we should therefore expect trading customs and movement of population quite distinct from the feeble movements between the tiny oases. From their valley homes and upland pastures the shepherds come for the supplies of chuña, chañar, dried fruit, wheat, and flour. Their dependence on the town is so great that in many cases they construct two huts, one at the home oasis in a quebrada miles away; another in the desert on the border of the gardens that surround San Pedro. They pasture their flocks on grasses and shrubs nearby, rest a few days, trade, and return. A few have even gone so far as to construct a third hut on some neglected patch of land at the common border of desert and irrigated land and there plant a few grains and seeds to help out their slender resources. Among the oasis products are a few which they have grown very fond of—chañar, for example. In very dry seasons the crop may be small and the owners unwilling to part with it. Then the nomads refuse to sell their ropes of twisted llama wool. Now the arrieros of the town must have these to hobble their beasts at night while on a journey across the desert. Leather thongs would chafe the legs of the mules and start troublesome sores. Moreover, they cannot be so securely tied and the security of one's beasts is a most important care in desert travel. If the shepherd will not sell his valuable llama wool ropes for money the arriero must exchange for them something of less value to him. Thus he reluctantly parts with his crop of chañar nuts, for which he may substitute wheat, rather than do without the wool ropes for which he has no substitute.

In the communal vicuña hunts, now of great antiquity, these pastoral nomads on the western flanks of the Andean Cordillera show most clearly their isolated condition. Elsewhere the ancient customs have largely disappeared. The priest has substituted the ceremonies of the Christian church for the old feasts of the harvest

and the chase. But the poor shepherds of the desolate country on the mountain border of Atacama still retain their old ways. Some of them are in pure form; even those that have become modified still have a strong flavor of the original paganism. Among them the vicuña hunt is by far the most interesting. Late in February or early in March, four or five days after the carnival of Chaya, the men of Aguas Blancas and Toconao go into the mountain country in search of vicuña. On the fifteenth day after the carnival the villages are almost depopulated. The women are busy stringing threads across the valleys down which the animals are to be driven for the vicuña will not pass a thread or rope stretched across his path. The men scatter widely in order to keep the quarry in the ravines. The hunters are mounted and when the vicuña become confused and huddled they are easily shot. He who kills a vicuña gets the skin, the most valuable part. Thus there is a strong incentive to compete in achieving the hardest part of the hunt. The rest of the animal is common property; since the hunt is cooperative all must share in some way in the spoils.

Of equal interest are the people of Antofagasta de la Sierra. In that small village on the floor of a canyon, remote and almost inaccessible in winter, live a group of shepherds that have but feebly responded to the movements of population and commerce about them. In the last hundred years they have belonged in turn to Bolivia, Chile and Argentina, without realizing the change. At last, title to their disputed territory passed definitely into the hands of Argentina. When the government made itself known they petitioned to be allowed to live on the land without the trouble of securing documentary titles and with all their ancient rights intact.

The degree to which pastoral conditions have guided the form which many customs have taken is perhaps best shown in the most important social relations of the people. It is not a disgrace for an unmarried girl to give birth to a child, or even three or four children, before marriage. On the contrary, it is a distinct advantage. Even small children, four to six years old, may guard large flocks of sheep. Hence the larger the number of children a woman can bring to her marriage feast the better pleased her husband will be. The children are therefore an asset; they constitute their mother's *dot*. Nor need they all have the same father. In short what would seem to us to be gross immorality is here regarded as a virtue though perhaps less because of any clear ideas of virtue than on account of a low stage of development and the practical



FIG. 24—Reed boats on Lake Titicaca. The thicker construction, as contrasted with the long slender lines of the Desaguadero boats, reflects the stormier nature of Lake Titicaca. The strongly upturned bow and stern enable the canoe to rise over waves of considerable height. The boats make so much leeway that they are sailed chiefly down the wind. These traders have been waiting two days for a favorable offshore breeze.



FIG. 25—Reed-thatched mud huts of the Uros Indians at Ancoasqui, Desaguadero Valley. The house on the left is a distinctive type with rounded corners and a mansard roof, adapted to the length of the reeds and the rounded walls.



FIG. 26—Chaco cattle in the Desert of Atacama, after a twelve days' journey across the Cordillera between Salta, Argentina, and San Pedro de Atacama, Chile.

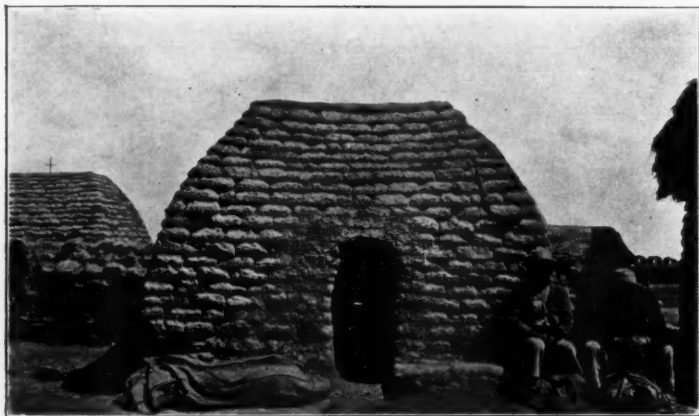


FIG. 27—Sod huts at Titipata, Desaguadero Valley. The thick-rooted, short grasses make a turf which has resulted in a different type of building material from that used elsewhere. This style of roof, adopted by people remote from forests, also avoids the use of rafters and ridge pole.

relation the custom bears to the business of securing a living under extremely hard conditions.

THE TRANSITION BELT OF COPIAPÓ

Southward from the almost rainless Desert of Atacama, in Chile, there extends a belt of country in which light, uncertain rains occur. The farther south one goes, the more frequent become the showers until in the latitude of Santiago they yield rain sufficient for agriculture, though it is only when we reach the Maule Valley 150 miles farther south that the amount exceeds 30 inches a year. In the Copiapó Valley the average is about two or three showers a year. In the Huasco Valley, one hundred miles south, there are twice as many showers and three times as much rainfall. This is then the transition belt between horse latitudes and westerlies where we find great variability in rainfall and in life conditions in places only a few degrees apart.

Ever since reading Darwin's famous description of them I have been eager to visit the valleys of the transition belt and gain some idea of the effect of the variable rains upon the life of the people. The study of the Tarapacá desert in northern Chile (1907) greatly increased my desire to visit the more southern valleys, and this at last became possible in July, 1913. Fortunately from the standpoint of geographic study, the region had suffered for several years from one of the most severe droughts in its history. On every hand I heard with what difficulty enough water was secured to keep the alfalfa meadows from drying up and the cattle from starvation.

Though there is more water at Vallenar, in the Huasco Valley 100 miles south of Copiapó, the same complaints were made there. It was predicted that rain would surely fall, because no rain had fallen for three years in succession. One day great masses of black clouds came rolling up from the south, rain was confidently predicted, and telegrams were sent to absent owners at Santiago. It was a novel experience to find water so important there that messages are sent whenever it looks as if it *might* rain! But the clouds dissolved in the late afternoon and I was disappointed on leaving to have missed a rainstorm in famous old Vallenar. At the suggestion of one of my hosts I left my future address, so that he might telegraph me news of the first rain.

A single heavy shower benefits pastures and fields and brightens the outlook of hundreds of people. Two showers bring a year of plenty, and three or more showers make the year memorable, if

indeed they do not bring floods and greater disaster than several years of drought. Eight years ago there were extraordinary floods at Vallenar; fertile fields were covered with coarse gravel; landmarks were swept away; and large tracts of land on the valley floor had to be not only reapportioned, but resurveyed. Tierra Amarilla, a village a few miles above Copiapó, was wholly undermined and the houses carried off in the flood of 1906.

The rivers of this whole region commonly do not reach the sea as a surface flow. They terminate in the alluvium that chokes their lower valley stretches and thus effect a subterranean discharge. Their normal condition is modified in years of high water. The rivers are then extended to the shore and great masses of waste are swept out into the ocean. Thus in 1888 the Copiapó River reached the sea, whereas now it terminates many miles inland in a salt-incrusted flat overgrown with low, gnarly shrubs and coarse grasses. The Rio Algarrobal (latitude 28° S.) last reached the sea in 1906. For years it had terminated above the pueblo Algarrobal, but in the four wet seasons succeeding 1902 it flowed to the end of its valley. Thus we have here, in the horse-latitude belt near the border of the westerlies, a type of drainage distinct from (1) that in the still drier north where the mountain streams terminate on the land, and (2) that in the wetter south where the streams always reach the sea.

The two elements of greatest importance in the study of the relation of the people to water supply in this border region are the local showers and the distant mountain snows. The showers are nature's gift to poor and rich alike; the snows, melting, discharge by way of rivers, and river water can be used only by the landowner who lives on the valley floor. Furthermore, the larger the estate the more water it is entitled to use, hence a greater disparity between the financial condition of the small and the large landowners in years of low water. The resources of the rich enable them to weather the temporary difficulties which years of drought inevitably bring. By contrast, the poor landowner may be forced to sell his farm and stock at just the time when they bring least. To him the droughts may mean not only distress but ruin.

In earlier years when there was a purely local market for farm products the rains were not an unmixed blessing. The owners of hired troops of mules, the cattle importer, the miner, were all benefited, since their stock found free forage. But the landowner who made a business of renting pasture or selling hay found his income reduced, because the lower prices of wetter years more



FIG. 28.—Looking down (south) the Desaguadero Valley at Fairweather Gap (center). In the bluff on the extreme right (foreground) are stratified sands and clays, the deposits of Lake Baillyvian. At their level in the right background are similar beds thinning out toward the skyline.

The same beds in similar relations may be seen in the left background. The older sedimentary deposits on which they rest dip strongly toward the left (east). They are in part of Cretaceous age, in part Permian, and were beveled off to form a local peneplain before the deposition of the lake beds. (See Figs. 29-33.)



FIG. 29—Looking east across Fairweather Gap. In the background, extreme left, the deposits of Lake Ballivian rest like a thin wedge upon the inclined sediments that outcrop on the opposite side of the Gap and dip away from the observer (east). The hill on which the camera stands is 210 feet above the Desaguadero River, which may be identified easily. The river is here 46 feet below Lake Titicaca. The difference, about 160 feet, represents the elevation of Lake Ballivian above Lake Titicaca.



FIG. 30—Finely laminated clays, silts, and sands of Lake Minchin above (north) Fairweather Gap. Their visible portion is here 30 feet thick and in places have as high as 15 to 30 thin, and about 7 thicker laminations to the inch. They are in strong contrast to the thick-bedded deposits of Lake Ballivian. They lie only on the valley floor, whereas the deposits of Lake Ballivian are now in most places eroded back some distance from the river.

than offset the greater product. Since the prices of all merchandise were, in the pre-railroad days (before 1851), largely controlled by the rate of transport from the coast ports, and this in turn by the abundance of free pasture and the price of hay, the wet years always carried the advantage of cheaper goods, and this advantage was shared by all. Those who had forage to sell, therefore, gained most in years of moderate dryness, when there was neither free pasture nor abundance of water for irrigation.

At the present time the nitrate industry alters this condition. Its steady demand upon the alfalfa meadows for the thousands of mules that are required for the caliche carts maintains the prices at a higher level, and many years of rain are now marked by a much higher level of prosperity for the landed proprietors. This in turn helps the poor laborer, the vagrant shepherd, and the small landowner who in former times was often pushed to the wall. Life has therefore become easier and safer; the former waste in years of rain and distress in years of drought has been displaced by organized commerce in response to the steady market in the nitrate desert. But the people have not in any sense lessened their dependence upon the rains. In fact, they have greatly increased it. A new industry and the general organization of commerce in which the railroad plays a large part have merely turned their dependence into new channels.

In the wet years, imported cattle from Argentina winter in the hills and are driven down to the valleys ready for the market. In dry years they arrive lean and weak after their long journey across the lofty desert mountains, and must be fed on rented pasture in the alfalfa meadows of the valley people. When dry years occur in succession the prices of forage may rise faster than the prices of meat, since the owner's draught animals are his first care. As a result the drovers stop their importations, for with rising prices the small buyer who is continually becoming poorer at last is unable to buy meat at all. If the dry period continues, mules may be driven from Chile into Argentina, there to winter on cheaper pasture until the return of normal conditions in the desert.

Formerly the mining industry absorbed not only the chief part of men's energies in the Copiapó region, but also most of the products. Cattle were then imported from Argentina for the mines, just as they are now imported for both the mines and the nitrate fields farther north. Great troops of hired mules were employed by the mine owners to carry copper and silver ores to

the coast ports. Both mules and cattle had to find subsistence in part on the desert upland where short grasses spring up after the winter rains. In the history of the mines there are many instances of distress owing to the poor state of the pastures. Exploring expeditions were early sent out to discover new routes along valleys where showers had been reported by travelers, and in at least one instance a new route led to the development of a new port as short-lived as the pastures to which it owed its origin. When a period of dry years set in all transportation had to be stopped, the ore accumulated at the mines, and chartered ships were sent back to Swansea either empty or half loaded. Thus dividends were passed more than once at London because of the lack of a few showers in Chile.

When the alfalfa fields dry up and neighbors are in sharp rivalry over water diversion the old colonial rule of the "turno" is enforced. A commission is selected with power to enforce water regulations. These require that only once every fourteen days may a landowner divert water to his fields and then in proportion to their size. But it is impossible to police the whole valley from the Cordillera to the town. Each landowner must therefore be to some extent his own commissioner and detect and punish unlawful diversion. Feuds arise and grow the more bitter because the valley is restricted in population and families are intimately related by village or social groups scattered up and down the valley. The quarrel of one thus becomes the quarrel of the group to which he belongs.

Said the manager of one of the mining companies at Copiapó in 1838: "It would be difficult for anyone who has not experienced it to believe in the robbery and quarreling constantly on foot with respect to rations of water in this extraordinary and desert district, along the whole course of the valley from the town to the Cordillera, a distance of ninety miles—all the lands being dependent for irrigation upon a little contemptible stream of water whose volume at any one point is barely sufficient to fill the wear of an ordinary flour mill.

"Notwithstanding the regulations that have been made by the authorities—and heavy fines imposed on infringements—such are the difficulties of proof and such the localities of the district that abuses can be practiced with impunity. . . ."

On more than one occasion I got myself into an embarrassing position on account of seemingly harmless questions about water rights. I soon found that a social guide was needed—one who could tell me who were friends and who were enemies. At times

it was necessary to exercise great care in receiving various officials and townspeople who were kind enough to call upon me, lest there should be formed an uncongenial group. It would be difficult for A to join B in polite explanations when A's servant had but lately broken B's servant's head. B would not feel nearly so badly about the broken head as about the alfalfa field that would now be ruined on account of the sudden interruption in the process of stealing water from his neighbor's canal. It was pointed out to me that the Decalogue does not include water among the things that shall not be coveted, hence water diversion from a neighbor's ditch at three o'clock in the morning seems to the drought-stricken farmer to resemble theft less than intense business rivalry.

But there is a happier aspect to the picture. With what enthusiasm a desert dweller still speaks of the years of abundance—when the rains came, and there was plenty for all. The influence of the seasons on the valley people is as marked as ever. In spite of a railroad, a higher degree of organization, and a position on one of the routes of world commerce, they find the rains a matter of deepest concern. When showers come cattle are driven to the free upland pastures. Between 1890 and 1892 the valley stock was sent into the hills, the owners lived in tents like true nomads, and in the plenty of those years forgot long-standing quarrels over water rights. The earth is then no longer a desert waste. Where sand and tough shrubs ordinarily hold sway there is now wild clover, knee-deep, luxurious. The erstwhile niggardly earth yields an abundance of food, as if suddenly awakened to generosity of its own free will—*sponte sua*, as Horace says. Flowers bedeck the light-green upland meadows. It is a year of rain!

Now that the nitrate fields are in a high state of development and in chronic need of laborers, the dry years in the southern valleys are times of migration to the northern desert. There they remain until they hear from relatives and friends that rains have brought plenty, whereupon they drift back to old occupations—the transport of merchandise by pack train, the cattle business, the production of alfalfa, or a host of minor projects which general prosperity encourages, if it does not create, and which general distress forces people to abandon.

THE LAKE SYSTEM OF THE BOLIVIAN PLATEAU

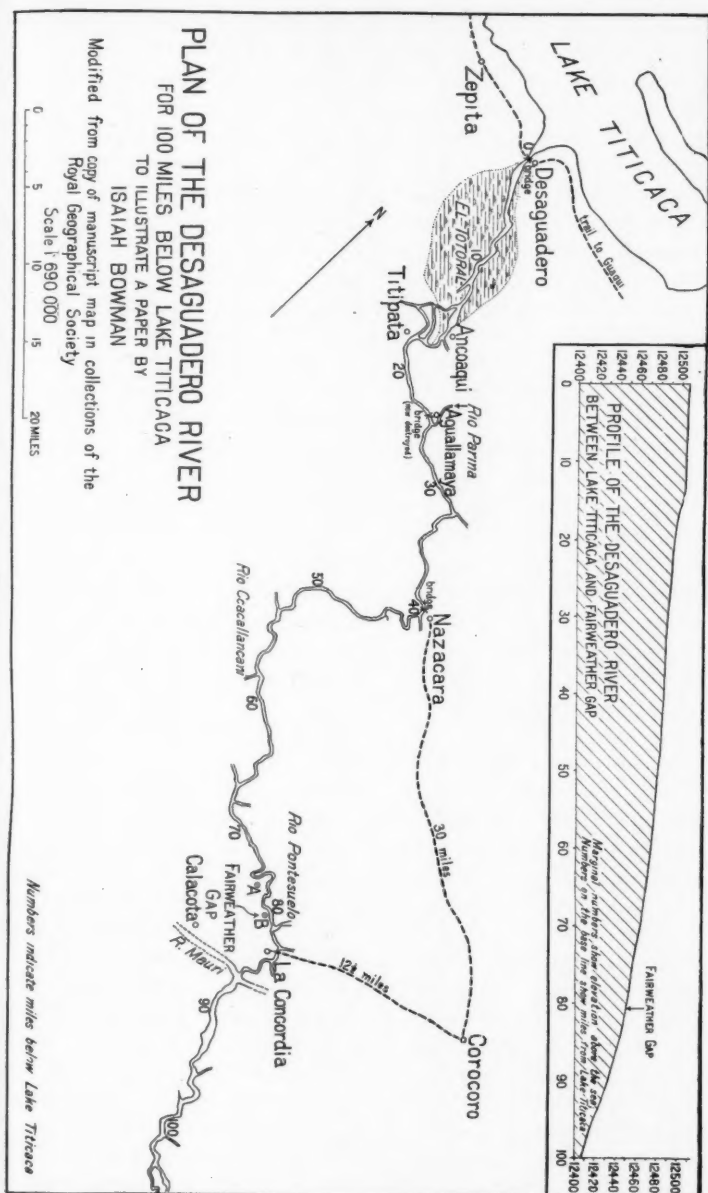
The work of the 1913 expedition in western Bolivia was confined to the solution of a problem that has long puzzled students of geography—the history and relations of the system of plateau

lakes. Three distinct water bodies were formed in the Titicaca-Poopó basins, whereas in the past both shore forms and bottom deposits of the great depression in the tableland have been considered to be the products of a single water body whose shrunken remnants are the Titicaca and Poopó of to-day. The full discussion of the details with references to earlier views will be left to a later paper. It is sufficient here to outline the conclusions and the main facts on which they rest.

In 1907 I entered Bolivia from Chile via the Cueva Negra pass in the Cordillera Sillilica and found, on the western border of the Poopó basin, strand-lines of a vanished lake. This lake I propose to call Lake Minchin, after the late Juan B. Minchin of Oruro, whose studies of forty years ago mark the beginnings of our scientific knowledge of the Bolivian basins. Though I had only aneroid measurements of the elevations of its shores, it seemed incredible that the lake should ever have been several hundred feet higher than Lake Titicaca, as some have supposed. The old shorelines of the lake are also clearly visible on the Cerro de Oruro as at many other places, and everywhere they seem to be horizontal and below the level of Titicaca. The problem of the relation of Lake Minchin to Lake Titicaca is complicated by the presence of lake deposits at a few points about the border of the Titicaca depression. It was adding confusion to complexity when certain students began to assume that the widely scattered deposits of a still earlier lake system were part of a great series made in a single lake of gradually diminishing size. Such a conclusion identified as one not only lakes in different basins, but also lakes belonging to distinct geologic epochs and possibly even to distinct periods.

From brief studies at various points on the border of the Titicaca-Poopó basin I reached the conclusion that the Desaguadero Valley held the facts most necessary for a correct solution. A short visit in 1907 to the head of the Desaguadero Valley resulted in a few new data, but left the most important part of the problem unsolved. I therefore made arrangements in 1913 to descend the Desaguadero, if need be to Lake Poopó, and to get critical evidence bearing on the succession of lakes and their relations. Happily, the necessary relations were encountered about eighty miles below Lake Titicaca, with the following results:

Lake Minchin—a temporary lake of glacial times—extended up the Desaguadero Valley beyond Concordia to a point about thirty miles south of Lake Titicaca and thence southward over the whole Poopó basin. Finely laminated clays lie on the floor of the



valley and are interpreted as bottom deposits. They indicate that Lake Minchin stood from thirty to forty feet below the present level of Lake Titicaca. Their elevation coincides remarkably well with the highest strand-line at Oruro, 125 miles to the southeast, and the elevation of the shorelines at Llica toward the Chilean frontier, 200 miles south. It thus seems established that Lake Minchin never reached Lake Titicaca. The bearing of this fact may be appreciated from the statement that it was to the coalescence of these lakes and their former greater elevation that students formerly ascribed the assumed higher strands of Lake Titicaca.

This conclusion was rather clearly forecast, though by no means established, by the work of 1907. The climax of the present study was the interpretation of the relations of both Lake Minchin and Lake Titicaca to a third lake which I propose to call Lake Ballivian, in honor of Don Manuel Vicente Ballivian, Bolivia's most distinguished scholar. At various points about the borders of Lake Titicaca and from fifty to one hundred feet above it there have been found in past years clay deposits containing shells similar to those now inhabiting the shore of the lake. But the deposits are of small extent and have associated with them no shore terraces or beach deposits that would make clear their origin. In the examination of clay outcrops in quebrada Carabaya, back of Guacui, and in the hills at Tiahuanaco I found shells and reed impressions similar to those on the existing shore. They occur up to 125 feet above the lake and appear to be in a late stage of erosion, since they occur in scattered remnants and their associated shores have since been completely eroded away.

At the southern end of the Totoral, a great swamp in the Desaguadero Valley just below the outlet of Titicaca, there is a little village of Uros Indians. The houses are built at the top of a low bluff on whose face there outcrops a white marl containing identically the same shells. The elevation is only a few feet above Lake Titicaca. The farther down the Desaguadero one goes the higher these marly deposits lie, until at Nazacara they outcrop 100 feet above the river. They also become interstratified with sand, silt, and brown clays. The latter group of deposits increase in thickness down valley and, ten miles above La Concordia, they terminate on the slopes of a broad ridge which crosses the valley. At the point of termination they are 210 feet above the Desaguadero and 160 feet above Lake Titicaca. These measurements are based on both hand leveling and aneroid determinations with the river as a base. The river gradients and the exact elevations at every

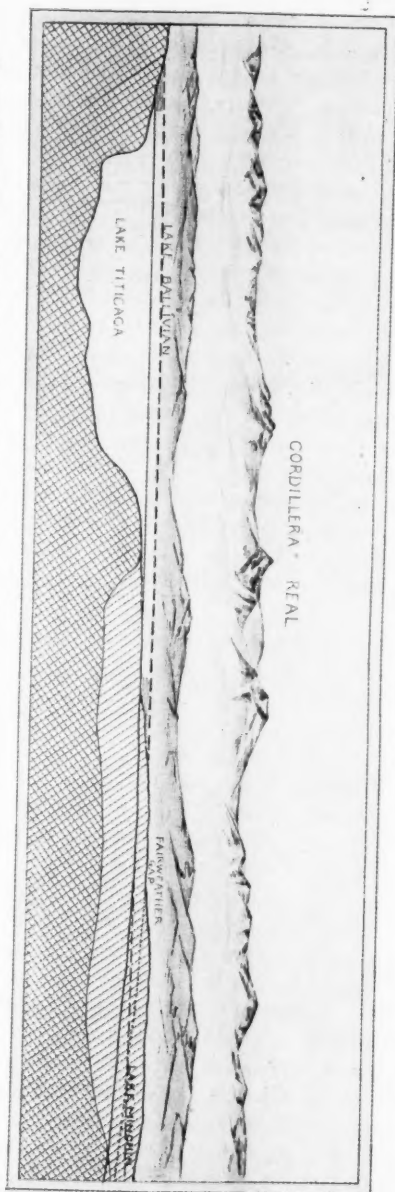


FIG. 32.—Diagrammatic sketch of the lake system in the Titicaca-Poopo depression. The profiles of Titicaca and the Desaguadero are drawn to scale; likewise the various lake levels, but the Cordillera Real and the intervening smooth-contoured range are sketched only in the most general way. Looking east. (For details at Fairweather Gap, see Fig. 33; see also Figs. 28 and 29.)

point we were able to secure from a manuscript map made by engineers of the Peruvian Corporation. This had been deposited with the Royal Geographical Society, and to their courtesy in allowing a copy to be made we owe more than we can here express.

Dr. G. H. Dall of Washington has identified some of the shells from Ancoaqui as probably early Pleistocene. For our present purpose their precise age is not a matter of great importance. The points of chief interest are: (1) They are the deposits of a lake that once stood 150 feet above Lake Titicaca; (2) the outlet of the lake in which they were deposited was cut down and the deposits themselves deeply and widely eroded before the last glacial epoch of the Central Andes began; and (3) deposits of glacial Lake Minchin lie on the floor of the Desaguadero Valley cut into the beds of the earlier lake. The outlet of Lake Ballivian is now a gap in the hills above La Concordia (Figs. 28 and 29). To it I have applied the name "Fairweather Gap," after F. W. Fairweather of Guaqui, to whom I owe a heavy debt of gratitude for assistance in transportation and for his interest in the problems of the Desaguadero Valley. The chief relations of the three lakes, their deposits and outlets, are shown in the accompanying photographs and sketches. A full discussion will appear in a later number of the *Bulletin*.

A journey about Lake Titicaca, with frequent stops for the examination of apparently critical localities, leaves me still in doubt as to certain important chapters in the history of the basin. In many places one cannot find remnants of the clays of Lake Ballivian in protected places where they would be most likely to survive. Furthermore, the clays and marls of the Desaguadero Valley are unequal in height, though their inequality seems to be confined to the vicinity of Lake Titicaca. In the middle stretches between Fairweather Gap and Ancoaqui they appear to be horizontal. These facts are scarcely more than hints that the Titicaca region may have been subject to deformation at the end of an early lake period and that through this deformation it gained its present attitude, which it has kept through a cycle of erosion so prolonged as to soften its tributary slopes and all but remove former shore terraces and border deposits.

The numerous shore lines to which Agassiz referred in 1879 do not exist. Lake Titicaca has stood at or near its present level ever since the period in which its outlet cut down Fairweather Gap to about its present level. That it has long been at this elevation is shown by the fact that it has suffered no significant change

of level during both the glacial and postglacial periods. Fifty-five miles below Lake Titicaca the deposits of glacial Lake Minchin still remain, but slightly eroded, on the floor of the Desaguadero Valley. Compared with Lake Minchin, Lake Ballivian is old and was the product of a stage of deformation intermediate between that which

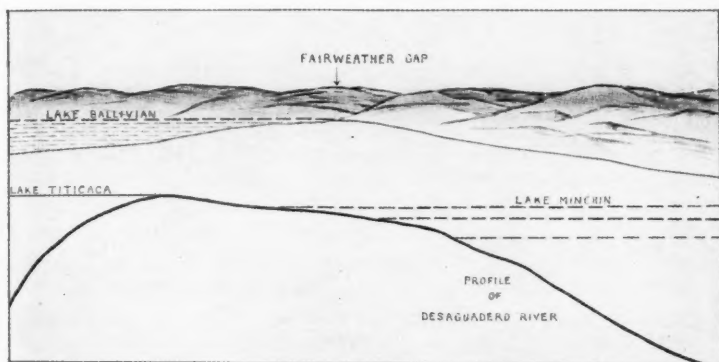


FIG. 33.—Sketch showing relations of lake levels at Fairweather Gap. Fig. 32 is too small to show these relations accurately. Lake Minchin—a temporary lake of glacial times—came into existence long after the Desaguadero had cut down its valley from the level of Lake Ballivian to that of Titicaca.

defined the great central basin region of Bolivia and that which gave the land its present attitude.

It is an interesting consequence of the above conclusion that the great salt deposits of the salinas west and south of Lake Poopó are not alone the accumulations of the Titicaca discharge or of temporary Lake Minchin of glacial times. They represent also the accumulations of that long period when Lake Ballivian discharged south through Fairweather Gap, a period of time possibly several thousand times longer than that representing the duration of Lake Minchin.

STEFANSSON'S EXPEDITION

The following letter from Mr. Vilhjalmur Stefansson, dated Point Barrow, Alaska, Oct. 31, 1913, has been received by our Society. It contains the first detailed statement of the plans for exploration he had formulated before the drifting away of the *Karluk*. This statement is of much importance, as Mr. Stefansson hopes still to carry out practically his programme of work and that with the collaboration of the *Karluk*. He outlines his modification of and additions to his working plans during the period before the opening of navigation next summer rendered necessary by recent events; and discusses the experience of other vessels caught in the ice as the *Karluk* was in the Point Barrow region, drawing inferences as to the prospects of the *Karluk* under various circumstances. Mr. Stefansson writes:

"Hitherto I have not been able to prepare for publication a statement of the organization, plans and fortunes of our expedition to this time. The leading facts may be of interest, and I here present them.

"We had three ships when we left Port Clarence, the *Karluk*, *Alaska* and *Mary Sachs*. I was in command of the *Karluk* with Captain B. A. Bartlett as sailing master. Dr. Anderson and Captain Otto W. Nahmens were in charge of the *Alaska*, and Kenneth C. Chipman and Captain Peter Benearde were in charge of the *Mary Sachs*. As the *Alaska* was detained at Port Clarence because repairs to her engines were needed, the *Karluk* and *Mary Sachs* left her behind, sailing on July 27. We do not know when the *Alaska* sailed. It was arranged that the three ships should meet at Herschel Island; but if the *Karluk* arrived there first she was to land certain stores she had on board for the other ships and then go north without awaiting their arrival.

"The *Karluk* party was to confine itself chiefly to exploring the sea west of the Parry Islands, and especially those unknown waters to the west and northwest of Prince Patrick Island. We hoped to take the *Karluk* north along the 141st meridian until we should discover land or she was stopped by ice. If we found land a base station was to be erected there; if we were stopped by ice our purpose was to try to follow its edge eastward and to make a base for our first year's work, preferably near the southwest

composed of Dr. R. M. Anderson, Commander, mammalogist and ornithologist; J. J. O'Neill, geologist; Kenneth G. Chipman, topographer, with J. R. Cox as assistant; Henry Beuchat and D. Jenness, anthropologists; Fritz Johansen, marine zoologist; William L. McKinlay, magnetician, and George H. Wilkins, photographer. Chipman, Cox, O'Neill, Beuchat and Jenness, all experienced men, were detailed by the Geological Survey of Canada. Wilkins is a competent cinematographer and it is expected that his pictures of the uncontaminated Eskimo of Victoria Island will be of great ethnological value; Dr. Anderson was with me for four years on our last expedition; McKinlay, a young graduate of Glasgow University, was thoroughly trained for his work, though without field experience.

"Mr. Chipman was placed in charge of the *Mary Sachs* at Port Clarence because the oceanographical equipment was on the *Karluk*, and Mr. Murray therefore had to go with the *Karluk* so as to be able, while sailing to Herschel Island, to divide this equipment suitably between himself and Dr. Mackay, who was to do the oceanographical work with the northern party. Mr. Murray, at Herschel Island, was to take charge of the *Mary Sachs* and Mr. Chipman was to be transferred to the *Alaska*.

"The southern party were to cover these departments of study: Mammalogy and Ornithology by Dr. Anderson; Marine Zoology, Botany and Oceanography by Johansen; Topography by Chipman and Cox; Geology by O'Neill; Magnetism by McKinlay; although McKinlay was placed in charge also of meteorology, the observations in this department were to be made by anyone at base camp when the others were engaged in field work. The location I selected for a winter base [Dolphin and Union Strait] was chosen because here driftwood from the Mackenzie River is likely to be in ample supply for firewood and house-building. There is much game also in this neighborhood, both caribou and seals. The country to the south as far as Great Bear Lake has never been crossed by white men. My observations on the edges of this section led me to believe that it is intersected by rivers running in deep gorges and largely covered by hills showing many precipices. In this case geological work can best be done here in winter, for the river cliffs, which cannot be reached on account of deep and rapid water in summer, may easily be approached on the winter ice. The topographers and geologists, it was therefore decided, should spend the winter of 1913-14 working up the region between the coast and Great Bear Lake. Then they were to cross Wollaston Peninsula late

in March to the head of Prince Albert Sound, and from the base which the *Mary Sachs* was to establish there, as mentioned above, they were to complete the mapping of the northeast coast of Victoria Island between the farthest points reached in their surveys by M'Clure and Amundsen (Hansen). They were also to explore the large river flowing into Prince Albert Sound from the east, and if possible the river which flows east from the center of the island into Albert Edward Bay.*

"The most favorable location in this district for anthropological work is on Dolphin and Union Strait. The Akuliakattagmiut tribe lives here and is the most westerly, and therefore the most isolated, of the copper Eskimos. Neither they nor their forefathers ever saw white men until the spring of 1910. It was among them and the Kanghirgyuargmiut tribe of Prince Albert Sound that European-like characteristics were found by us to be most pronounced. The latter tribe came in contact both with Collinson and M'Clure, but the evidence shows that this could have had practically no effect upon their manners and customs.

"It was left to Dr. Anderson to choose winter bases for the second and third winters, which would naturally depend upon the achievement of the first year.

"The scientific staff of the *Karluk* was to consist, besides myself, of George Malloch, geologist, detailed from the Canadian Geological Survey; B. M. McConnell, meteorologist and photographer; Dr. A. F. Mackay, surgeon and oceanographer; and Bjarne Mamen, assistant to the geologist and oceanographer.

"It was the purpose to have the *Karluk* give her summers as far as possible to the exploration of the unknown region; sledge journeys were to be made in winter over the sea ice in search for new land and to take soundings and carry out such other oceanographical work as was possible. In the summer season also the geology, zoology, botany and archaeology of any accessible land will be studied. Every effort was to be made at the end of the first year to transfer Mr. McKinlay to the northern party, so as to give more geographical scope to his magnetic work.

"These were our plans when we sailed. They may still be considered our plans, though mishaps have made it impossible at once to carry them out. It may be that the *Karluk* will not be able to continue her part of the work next summer. If this is so the *Mary Sachs* will take her place.

"The details I wrote of the summer happenings have probably

* These two rivers were discovered by Stefansson on his last expedition.

been printed in the newspapers. I shall not here repeat them. This was a bad ice year between Point Barrow and Herschel Island and the autumn frosts came much earlier than usual. The *Karluk* was solidly frozen in on August 17, and even on August 6 the young ice was strong enough to walk on near Point Barrow.

"There are ice ships no doubt which could have forced their way ahead in places where the *Karluk* was delayed. But, as she came up to her specifications and to our expectations of her, her failure to reach Herschel Island must be charged either to bad luck or bad judgment. In Port Clarence I took aboard the *Karluk* five members of the southern party: Murray because he had work to do on the *Karluk*, McKinlay because he was to establish a magnetic station at Herschel Island, Beuchat and Jenness because they wished to spend a few days with the Herschel Island Eskimos and Wilkins to take pictures. We expected to land these five men at Herschel Island, where they were to await the *Alaska*, excepting Murray, who was to transfer to the *Mary Sachs*. The latter vessel was to accompany the *Karluk* all the way to Herschel Island. The two vessels, however, were separated in a gale at Kotzebue Sound and I have not seen her since. I have only just learned at Point Barrow that both the *Alaska* and *Mary Sachs* are safe in winter quarters at Collinson Point. It is to be regretted that five men of the southern party are aboard the *Karluk*, for their work was to be with the other vessels which were carrying the provisions, equipment and clothing intended for them. We tried in August to land Beuchat and Jenness at Flaxman Island though eighteen miles of floating ice intervened, but it was impracticable to take them ashore with the six weeks' provisions they needed to equip them for a journey to Herschel Island should they find that the other vessels had passed to the eastward. If we had known, as we do now, that the schooners were at Collinson Point we might have landed the men without burdening them by heavy gear.

"If during the winter the *Karluk* should drift and come to rest within practicable distance from shore all the members of the southern party will be transferred to land to join the schooners.

"As for ourselves, situated as we are, we shall try to do such scientific work as there is opportunity to do. The two chief features of my winter plans are a sledge journey north from Barter Island and the exploration of the Mackenzie Delta. Both these projects may prove to be of considerable geographical interest.

"The ice journey over the sea north from Barter Island should be made in February and March. If we should attain a point

only 100 miles from shore we might determine the edge of the continental shelf at least; while if we should find ice conditions favorable, 300 miles does not seem too much to hope for. Our route would lie about 100 miles east of the place where Leffingwell and Mikkelsen made their sledge journey north on the sea ice. As far as I know no vessel has ever been over 50 miles from shore in the longitude of Barter Island. Barter Island hugs the coast in about 144° West Long.

"With regard to the exploration of the Mackenzie Delta I may say that the Mackenzie is the largest river in Canada, and is likely to attain some time a commercial importance second only to that of the St. Lawrence River. There is a serious hindrance to navigation in the series of rapids sixteen miles long between Smith Landing and Fort Smith, about midway between Athabaska and Great Slave Lakes. According to the Hudson Bay Company's figures this leaves about 1,500 miles of navigable water from the falls to the ocean, 1,300 miles of which have been repeatedly navigated by the screw propeller steamer *Wrigley*, drawing 6½ feet. The most northerly 200 miles have been navigated only by sail boat drawing less than five feet. This is the delta of the river. It is about 100 miles wide and there are numerous channels and islands.

"It seems likely that careful surveys of the more important of these channels will bring to light a route that will be safe for a steamer drawing the 6½ feet, which it could carry all the way (1,500 miles) south to the Smith Rapids. As the Mackenzie may spring into an importance comparable with that of the Yukon, it seems that the charting of its delta and the sounding of its channels is a work of great practical value. The main part of the survey work can most conveniently be done between March and July, inclusive. In March, April and the first half of May the work would be done by sledge and in June and July by boat, and the survey party would be at Herschel Island the last week in July ready to join the *Alaska* on her way eastward to Coronation Gulf to take up the regular programme of the expedition.

"We do not know, of course, what may happen to the *Karluk* this winter, but the experience of other vessels under similar circumstances may give us some light as to the probabilities.

"The bark *Young Phoenix* was abandoned in the ice off Point Barrow in August, 1888. Before the freeze-up that fall she was seen off Collinson Point, but no one boarded her. She was sighted the following spring in the ice off Sea Horse Islands. Eskimos

boarded her several times and she floated slowly up the coast about 7 miles from the shore. She was boarded by Mr. C. B. Brower and Mr. George B. Leavitt when she came opposite Cape Smythe and at that time she had incurred very little injury, though there was much water in her hold. She was not sighted later.

"The steam auxiliary bark *Navarch* in August, 1898, was abandoned twenty miles offshore from Point Barrow. She was one of the strongest vessels ever in the western Arctic. Late in September she was sighted again some 20 miles off Cape Simpson, when she was boarded by Mr. Thomas Gordon; and in October Mr. C. D. Brower went aboard with twenty-two dog sleds and took from her practically everything of value except her coal. In December she was sighted again, this time coming in from the west with the ice about twelve miles south of Cape Smythe. The ice brought her within two miles of the shore and then carried her parallel with the coast until she stopped three or four miles north of Cape Smythe. She was finally crushed by having her entire bottom forced off.

"In the autumn of 1909 the sailing schooner *Ivy* (140 tons) went aground three miles east of Point Barrow and the young ice formed around her. In December a strong southerly gale carried her off in the ice. In the following July she came into view again, drifting up from the southwest parallel to the coast, and passed Cape Smythe some twelve miles offshore. She was at first mistaken for one of the incoming ships and was not properly identified until it was too late. Other ships had been abandoned in the vicinity of Point Barrow and have never been sighted again. It is probable that many of them were crushed and sunk before winter set in.

"It seems likely, therefore, that the *Karluk* will be comparatively safe from the pressure while she remains a considerable distance offshore, and will be likely to be crushed if she comes in on the coast southwest of Point Barrow, for this stretch is exposed to strong gales from the open sea and consequent pressure. Ice pressure is also felt on the coast east of Point Barrow, but to a less degree.

"The men would be quite sure to get ashore safely if the vessel should be crushed in winter, but whether their equipment could be saved would depend upon her distance from land and the travel conditions over the ice. There would be more danger of loss of life should the *Karluk* be crushed next summer, although the chance of safety would be greatly increased by the fact that

the *Karluk* is equipped with three skin boats any one of which could carry the entire company (six scientists, fourteen crew and five Eskimos). These boats weigh each less than 500 pounds and are far stronger than a whaleboat or other wooden boat of similar size. It will be seen, therefore, that in the event of a retreat over the ice to the shore the party would not meet the terrible difficulties which the *Jeannette* expedition encountered because of the heavy weight and the fragile character of their boats.

"If the *Karluk* is seriously injured in the ice this winter or cannot get out of the ice next summer the *Mary Sachs* will have to take the *Karluk's* place in transporting the northern party to Prince Patrick Island. My present inclination is, if the *Mary Sachs* should reach Herschel Island while the coming of the *Karluk* is still problematical, to have her proceed to Prince Patrick Island, to be followed by the *Karluk*, if she is able to go on. It is possible that, under certain circumstances, I may decide to go by sled either to Banks Island or Prince Patrick Island this winter in advance of the ships. We should be able to complete the coast line survey and to carry out geological and archaeological work after the disappearance of snow in summer. We would not be likely to be in danger or great discomfort even should the vessels not be able to follow us next summer and we were thus compelled to spend the winter there."

SECULAR VARIATION OF PRECIPITATION IN THE UNITED STATES*

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The economic importance of accurate statistics of precipitation has never been so fully realized in the United States as at the present time, but unfortunately with this realization comes a demand, insistent at times, for the application of the available statistics to times and places beyond those which they truly represent. This is especially true of undeveloped regions in the boom stage. In some quarters there seems to be some reluctance to appreciate the basic proposition that measurements of precipitation for a single year at any given place represent simply the precipitation for that year and place.

It is well known that the horizontal distribution of precipitation for short periods of time varies enormously within comparatively small areas; thus, in 1901, the annual precipitation on the west coast of the Florida Peninsula, as at Tampa, was but 42 inches, while at Jupiter, on the east coast, it was 76 inches, a difference of 34 inches in about 160 miles. Similar illustrations may be drawn from any other part of the country.

We distinguish two classes of variation in the horizontal distribution of precipitation, first, those of a local and temporary character which so far as can be discovered are purely accidental and, second, those which persist for a series of years and do not appear to be accidental. The first class is probably compensatory in character, and, from an economic viewpoint, is of little importance. The second class, on the other hand, may be of tremendous importance, as when the precipitation is so heavy as to lead to disastrous floods over large areas, or so light as to cause failure of crops.

At the present point in the discussion we will consider merely the effect of these two classes of variation in constructing a system of normal charts. The first class, being compensatory, has no effect on the normals provided the observations are continued over a long series of years, but the use of a short period of observations, say 5 or 10 years, is fraught with danger. Variations of the second class

* Read before the Association of American Geographers at New Haven, Dec. 27, 1912.

when they persist through a term of years naturally produce a material change in normal charts. The most notable example which has come to the writer's attention is the marked diminution in precipitation which has evidently taken place in the West Gulf states and lower Mississippi Valley within the period of measurements made by the United States Weather Bureau, which now extend over a period of 40 years.

The small table below shows the extent of the variation by ten year periods at four representative stations, as follows: Galveston, Tex., Shreveport, La., Vicksburg, Miss., and New Orleans, La.

STATIONS	GALVESTON	SHREVEPORT	VICKSBURG	NEW ORLEANS
1st ten years.....	51.8	52.9	59.3	65.6
2d ten years.....	50.1	48.7	55.3	57.6
3d ten years.....	40.6	38.1	49.2	50.3
4th ten years.....	43.2	41.3	49.1	50.1
1st period minus last....	8.6	11.6	10.2	15.5

Further comment on the above will be made later in this paper.

We will now attempt to examine the precipitation statistics for the country as a whole. The United States Weather Bureau publishes each month in the *Monthly Weather Review* the anomalies of precipitation, temperature, humidity and cloudiness for each of the nineteen climatic districts into which the country has been divided. The number of stations in each district from which the district departure is obtained varies from 4 in the case of the smaller districts to 15 in the case of larger and more thickly populated districts. Naturally the eastern two-thirds of the country has a larger representation than the western third. While it is possible to sum the anomalies for the whole of the United States and thus obtain a single unit which shall represent the anomaly for a month or a year, it is difficult to assign a proper value to the result which we would thus obtain. The different districts are unequal in area, therefore any value we might assign to the numerical departures for each district would be more or less in the nature of an arbitrary assumption, and consequently objectionable. Unless the district departures for any year are of considerable magnitude, either positive or negative, a numerical value for the whole country is apt to represent merely the small balance between positive departures in one part of the country and negative departures in other parts. If instead of attempting to compute

the numerical departure for the whole country we count for each year simply the number of districts with positive or negative departures respectively, having regard for the magnitude of the departures, the result will afford us, it is believed, a rough measure of the distribution of precipitation generally over the country as a whole.

The writer has summarized the annual precipitation departures for the whole country for 25 years, 1887 to 1911, in this way. He has considered only those regional departures which amounted to 2 inches or more, on the average, for the whole district and has counted simply the number of departures of that magnitude which have occurred in all of the districts for each year. Twenty-five years have been considered, and since there are 19 districts, we have 25 times 19, or 475, as the total number of annual departures used in the summary. Dividing these according to their magnitude we find that but 276 of them were greater than two inches. One hundred and ninety-nine (199), or 42 per cent., therefore have not entered into our computation, except as hereinafter stated. The departures greater than two inches are divided into 79 positive and 197 negative, or very nearly in the ratio of one to three. The preponderance of negative departures, by which is understood, of course, a diminished precipitation, is the most prominent feature of the summary. This statement, however, has a better aspect when we consider that the 199 districts having a plus or minus departure of less than two inches were actually years of very nearly normal precipitation; adding to these the 79 years of greater than normal rainfall, we have 278 districts out of 475, or 58 per cent., closely approximating the normal. On the other hand, the precipitation of 42 per cent. of districts was deficient by average amounts greater than two inches. The years in which a majority of districts showed precipitation in excess of the normal, eliminating annual departures of less than two inches, as above, were 1888, 1890, 1891, 1906, and in 1909 as many districts had precipitation above normal as below it. The dry years were 1887, 1894, 1895, 1899, 1900 and 1910—six in all, or nearly double the number of wet years. Unfortunately for our purpose reliable district departures for the known rainy years in the early eighties and the late seventies are not available.

An examination of the district departures for the United States as a whole lends no color to the theory of a cycle in precipitation, as advocated in some quarters in Europe. To this statement objection will be made on the ground that the period of observations

here considered is too short. We would reply that in several portions of the United States comparable precipitation measurements have been carried on over half a century; these do not afford any indications of a long period cycle or progressive change from wet to dry, and *vice versa*, but in practically every case confirm the conclusion that the occurrence of wet and dry years seems to be wholly fortuitous so far as the United States are concerned. In this vast area the causes that operate to produce years of light or heavy precipitation are subject to the same variations as the seasons themselves, and the likelihood that all of these various and complex forces should conspire to produce light precipitation or heavy precipitation all over the country is remote. In the history of this country the Mississippi River has never been in flood due to high water in *all* of its tributaries at the same time. The probability that all of its tributaries will be in flood at the same time is also remote, and on the same grounds the probability that heavy rains will occur in all parts of the country in one and the same year is so small that we ought not to be surprised at the relatively few positive departures disclosed in the summary above mentioned. On the other hand, diminished precipitation over great areas seems to occur with much greater frequency than increased precipitation. The tendency in nature, as shown by the summary of the last quarter of a century, seems to be toward years of lean rainfall, while years of fat rainfall seem to be due to an extraordinary deflection or disturbance in one or more of the dominant members of the atmospheric circulation; thus, when a majority of storms of any one year move from the North Pacific coast southeastward to Texas, thence northeastward to New England, there will be abundant precipitation in that year over the West Gulf states, the lower Mississippi and Ohio valleys, and the Middle Atlantic and New England states, whereas a dearth of storms moving in that direction is generally coincident with years of small precipitation in the same districts. In none of the 25 years here considered, 1887-1911, was precipitation in excess of the normal in all districts of the United States, and in but one year, 1910, was there a deficiency in *all districts from the Atlantic to the Pacific*. In that year the weather was abnormal in other respects than in precipitation. Beginning with an abnormally warm and dry spell which was general over the country the weather turned cool and relatively wet, and this latter was in turn followed by dry, hot weather which began in some districts in June and continued through the summer months. The peculiar-

ity of the precipitation of 1910 lies in two facts: first, a part of the deficiency in the total rainfall came at a time when precipitation was not essential to crop and vegetable growth; and second, in almost all sections there was considerable moisture in the ground at the beginning of the drouth.

From what has already been said it will be clearly understood that the precipitation varies not only from year to year but also as between the different parts of the country. During the historic drouth of 1894, in the interior valleys and the Atlantic seaboard, precipitation was unusually heavy on the North Pacific Coast states and the Northern Plateau, and it was normal in California. In the last 25 years the three Pacific Coast states, also the western Rocky Mountain Slope region, embracing parts of Montana, Wyoming, Colorado, western Nebraska and Kansas, Oklahoma, the Texas Panhandle, New Mexico and Arizona, have had a greater number of years of precipitation above the average than other portions of the country. The districts poorest in rain were the South Atlantic and Gulf states. The Lake Region, Ohio Valley and Tennessee, New England, and the Middle Atlantic states, were also deficient but not to so great a degree; practically the whole country east of the Mississippi has been passing through a rather prolonged period of deficient precipitation in which, however, there have been interspersed a few years of abundant precipitation. Inasmuch as the amount of the annual precipitation differs both in time and space the question of chronological variation can best be examined by considering relatively small regions where comparable measurements are available for a long period of years. The writer has examined the yearly fall of rain and snow for a 40-year period, 1872-1911, in four separate localities, and presents the results in diagrammatic form in this paper. The regions selected are, the West Gulf states and lower Mississippi Valley, represented by the four stations Galveston, Shreveport, Vicksburg and New Orleans, two coast and two interior stations; the state of North Carolina, represented by stations at Hatteras and Wilmington on the eastern coast, and Lenoir, in Caldwell County. The first named stations are practically at sea level, the last named is at an altitude of 1,186 feet, and distant about 30 miles to the eastward of the mountain systems which extend northeast and southwest, parallel with the western boundary of the state. The third region is New England, represented by eleven stations, viz., Eastport and Portland, Me., Concord, N. H., Burlington, Vt., Boston, New Bedford, Springfield and Taunton, Mass., Providence, R. I., and Hartford and New

Haven, Conn. The fourth district was selected to represent the interior of the country. Fortunately the geographical center of the United States is also a region near which precipitation measurements extending over half a century are available. This region is represented by five stations, two of which have measurements of precipitation extending over 61 years or from 1850 to 1910, the third station began its record in 1856, the fourth in 1858, and the fifth and last in 1868. The names of the stations are Fort Leavenworth, Kan., and Miami, Mo., 1850-1911; Oregon, Mo., 1856-1911;

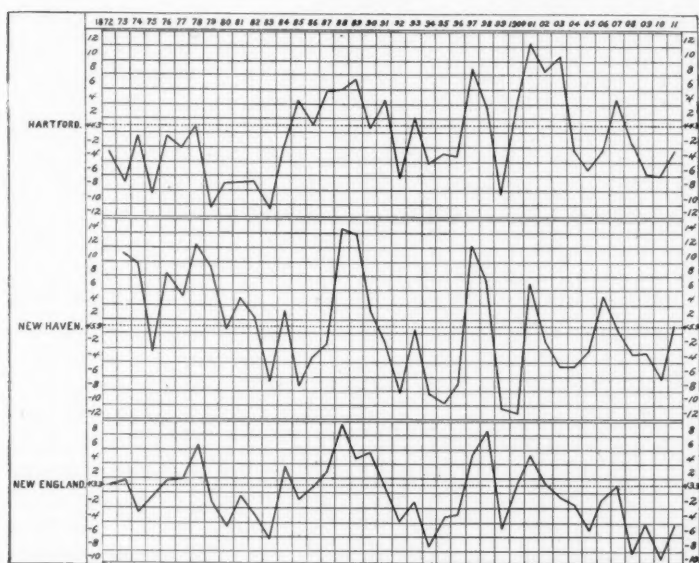


FIG. 1.—Chronological Variation of Precipitation in New England, 1873-1911.

Manhattan, Kan., 1858-1911; and finally Lawrence, Kan., 1868-1911. These five stations are so situated that if a circle of 86 miles radius be drawn from Fort Leavenworth, Kan., as a center, all of them would fall within the circumference of that circle.

Diagrams have been prepared (Figs. 1, 2 and 3) to show graphically the chronological variation in the above-named four districts. The purpose of the first figure of the series is to show the variations in horizontal distribution not only from the district mean but also as between nearby stations, such as Hartford and New Haven, Conn. The curves for this pair of stations show important dif-

ferences from each other and also from the general mean of the district.

It is apparent on inspection that the annual precipitation progresses from year to year in an exceedingly irregular manner and without, so far as is discoverable, any approach to uniformity of distribution in time or space. One year of heavy rain may be succeeded by a second, third or even a fourth year of abundant precipitation, and again a single year of heavy rain may be followed

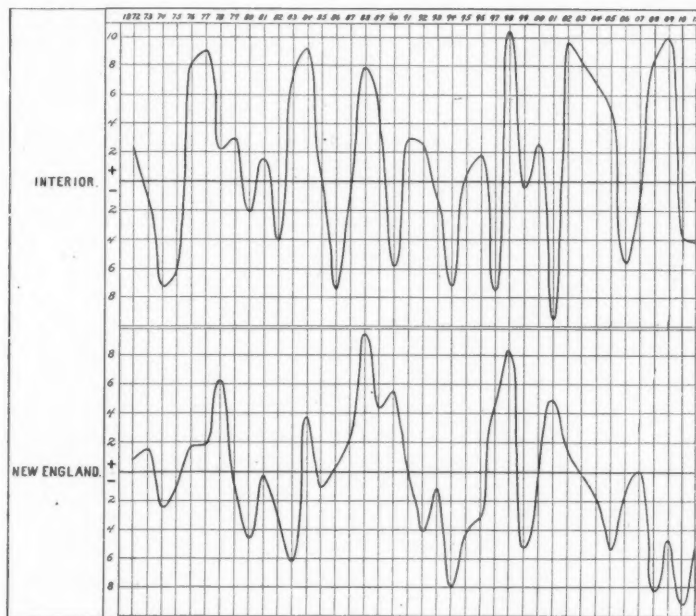


FIG. 2.—Chronological Variation of Precipitation in the Interior and New England, 1872-1911.

immediately by a year of light rain. The numerical values on which the Missouri Valley curve ("Interior" on Fig. 2) was constructed show that the greatest number of consecutive years with positive departures was 4, viz., from 1876 to 1879, both inclusive. A second period of four consecutive years with abundant rains occurred in the early years of the twentieth century, viz., from 1902 to 1905, both inclusive. The interval between these two periods is 27 years. From 1850 to 1872 in the Missouri Valley, there was no period of abundant precipitation equaling the above,

although the precipitation of 1851 and 1852, also 1858 and 1859, was abundant. Between 1850 and 1911 there were 18 periods varying in length from a single year to three consecutive years with light precipitation. There was a greater number of dry periods from 1850 to 1875 than in the subsequent portion of the record, viz., 17 in 26 years as against but 13 in 36 years. In the period common to all districts, 1872-1911, the Missouri Valley was dry in 1873, 1874 and 1875, also in 1885, 1886, and 1887, again in two two-year periods, 1893 and 1894, and 1906 and 1907. Considering the total period of 62 years, 29 were wet and 32 dry. In the same way we may analyze the New England record for the 40 years, 1872-1911 (Fig. 2). Nineteen of these were wet years and 21 dry. The West Gulf states curve for the same period gives 18 wet years and 22 dry years, North Carolina, 20 wet and 20 dry (Fig. 3).

The curves showing the annual variation for the West Gulf states and North Carolina are essentially different from those first considered. Instead of years of heavy and light precipitation following each other at comparatively short intervals, the years of heavy precipitation in both southern districts are massed in the early part of the record, and the years of deficient precipitation in the last half. The run of years with deficient precipitation in these two districts is unprecedented in the United States and the phenomenon might be viewed with serious alarm were it considered by itself alone. I wish to direct attention to the fact that in the midst of the long run of years of deficient precipitation suddenly there appears one or more years of heavy rains, as in the West Gulf in 1888, 1900, 1901, and 1905, in North Carolina in 1901 and 1908. The year 1888 was one of abundant rains in other parts of the United States, and so were the other years, though in a less degree. This suggests at once that the control of precipitation, whatever it may be, is general in its operation rather than local. The precipitation of the year 1905 was peculiar in that the regions of abundant rains were all west of the Mississippi. The East Gulf states were in the region of negative departures, while the West Gulf states had well-marked positive departures. Since it seemed that here the differences might be due to local influences the record of weather conditions pertaining to the Gulf states for the entire year were closely examined, with the following result. The character of the rain year was determined by the amount of rain which fell over the West Gulf states in April and June. In April four well-marked rain periods occurred in connection with that number of

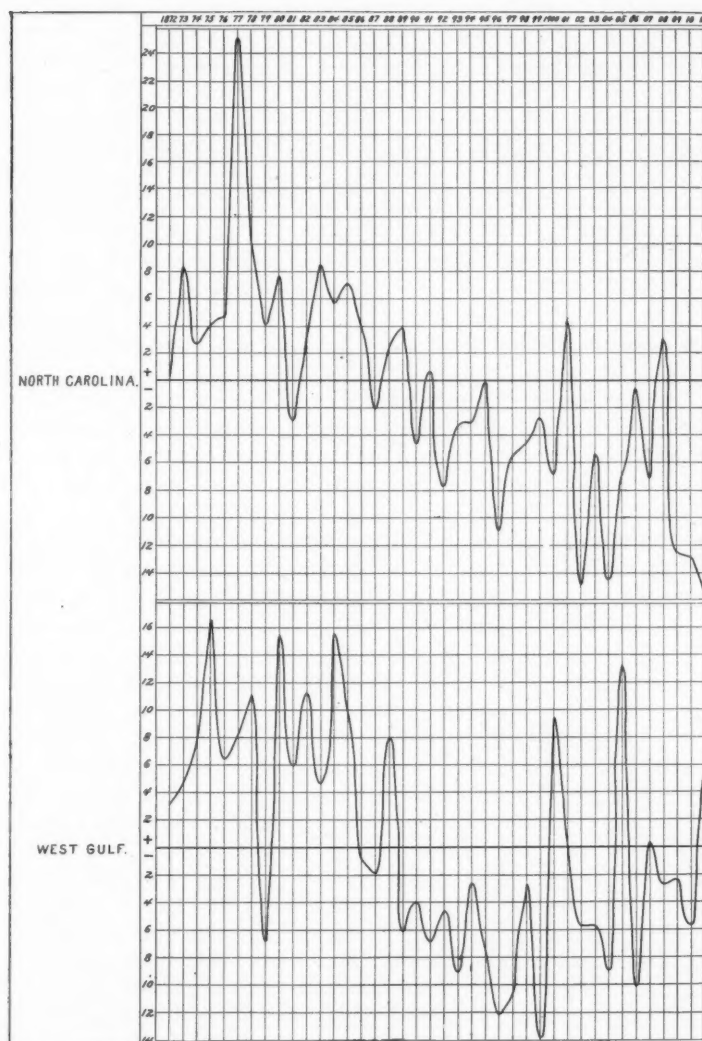


FIG. 3.—Chronological Variation of Precipitation in the West Gulf States and North Carolina, 1872-1911.

cyclonic disturbances, three of which moved southeastward from the North Pacific coast and curved to the northeast over the West Gulf states; the fourth developed as a secondary disturbance over Texas and followed the path of the others. All of these disturbances were accompanied by heavy precipitation over the West Gulf but not the East Gulf states. The heavy rainfall of June was due to a shallow barometric depression which overspread the West Gulf states and the Mississippi Valley from about the 18th to the 26th and gave heavy and continuous rains for about 10 consecutive days. This depression was not even charted among the storms of the month, so indefinite were its boundaries and so devoid of movement was it, yet the conditions it embodied were ideal for producing heavy and continuous rains. Such barometric conditions develop only at long intervals, and thus again the same idea that has been suggested elsewhere in this paper presents itself, viz., that it is the exception rather than the rule that atmospheric conditions are favorable to heavy rains over widely extended districts, and that the probability of such rains becomes less the greater the area involved. The probability that the rainfall will be normal is also very small; for the 25 years elsewhere considered it might have been represented by the fraction $2/475$. The distribution mostly to be expected is that which approaches closely to or falls slightly below the normal.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Additions to the Map Collection. The following are some of the more important maps recently received by the Society: The new 9-sheet map of the United States, by the U. S. Geological Survey (1:2,500,000); Part I (Pines) of the Forest Atlas of the United States, issued by the same bureau; the set of the published sheets of the half-inch-to-mile topographic map of Canada, published by the Department of Militia and Defence; the 1:2,000,000 general map of Mexico, published by the Department of Public Works; Paulsen's large-scale map of the oilfields of Mexico*; the railroad map of Brazil, published by the Ministerio de Viação e Obras Publicas (1:2,000,000); Dr. Jannasch's Map of Central Argentine and Chile and his special map of Santa Catharina, Rio Grande do Sul and Uruguay (both 1:1,000,000); the "Karte des Sperrgebietes in Deutsch-Südwestafrika," published by Reimer (1:100,000); the set of 31 maps (1:200,000) accompanying the account of Dr. Albert Tafel's explorations in China and Tibet*; the set of itinerary maps to illustrate Count Charles de Polignac's travels in China; the sheets of the 40-verst map of Asiatic Russia and adjoining countries; revised sheets of the bathymetric map published by the "Cabinet Scientifique du Prince de Monaco," Paris*; 560 sheets of the 1:100,000 map of France published under the auspices of the Ministère de l'Intérieur.

Professor Bowman's Lecture on the Central Andes. At the special inter-monthly meeting on February 3, Professor Bowman lectured before the Society on the Central Andes. His remarks were based on his three expeditions to this region, the last carried out during the past summer under the auspices of the American Geographical Society, the results of which are published at the beginning of this number. Professor Bowman's remarks, supplemented by lantern slide views, dealt with a cross-section from west to east through the Central Andes, which he defined as that portion of the Andean highland which is characterized by interior drainage. Paralleling the coast first come the relatively low coast ranges, to the east of which lies a desert strip characterized by the *salars* which contain the nitrate deposits that are of such economic importance to Chile. On the east this desert strip is bordered by the Western Andes, or Maritime Cordillera, which together with the Eastern Andes, or Cordillera Oriental, on the eastern margin of the Andean highland, enclose the great central basin, or *altiplano*. The general conception of the Maritime Andes as a majestic range of lofty mountains rising abruptly from the sea is incorrect; they are rather a broad plateau, a peneplain uplifted to an elevation of 14,000 ft. This was well brought out by Professor Bowman's lantern slides, which showed broad slopes characterized by relatively little relief. It was only when a picture of the Cordillera Oriental was thrown on the screen that rugged alpine forms with snow-capped peaks appeared. In great contrast to these and to the general aridity of the Andean highland, which they join on the east, are the Amazon lowlands with their high precipitation and tropical forests. The degree of this contrast was well illustrated by the last slide, which represented a huge epiphyte, which, by the very attitude of its branches, seemed to be devouring the host upon which it grew—a picture of the luxuriance of life in the lowlands compared with the barrenness and aridity of the highland. Professor Bowman also referred in detail to the human inhabitants of the region and their activities, particularly to the trade in cattle carried on between Salta and Jujuy in northern Argentina and the nitrate camps in the desert near the Pacific coast which involves driving the animals, summer and winter, over passes more than 15,000 feet high, and forcing them over waterless districts where they sometimes have to go without food for as long as three days.

* Reviewed in the *Bulletin* as follows: Mexico, Vol. 46, 1914, p. 156; China, Vol. 45, 1913, pp. 877-879; bathymetric map of the oceans, Vol. 46, 1914, pp. 158-159.

NORTH AMERICA

Oceanographical Investigations by the Department of Commerce. On Sunday, January 25, the Coast Survey Steamer *Bache* sailed from Hampton Roads on an oceanographical cruise which will embrace the physical, zoological and botanical inquiries that are now recognized as of importance to navigation, the fisheries and meteorology. The cruise will be from Cape Henry to Bermuda, and thence to the coast of Florida. In addition, lines will be run across the narrowest part of the Gulf Stream between Florida and the Bahamas and from Key West to Havana. Soundings, the deepest of which will be in water over three miles deep, will be made at intervals of from ten to seventy-five miles. The temperature of the water will be taken at various depths between the surface and the bottom. Specimens of water will be secured from different submarine levels. The direction and velocity of water currents will be ascertained in investigating the tides and currents at a distance from shore, and possibly in the deep sea.

Plants and animals will be collected not only at the surface and the bottom, but at intermediate depths. Microscopic organisms which serve as the food of larger animals, and on which the distribution and even the existence of fishes is ultimately dependent, will also be collected. Particular attention will be paid to the collection of young fishes, through the study of which it is hoped light may be thrown on the spawning places and migrations of species valuable to man, but the whereabouts of which during a considerable part of their lives is now unknown. Studies of this kind have recently shown that the eels inhabiting the rivers and coastal waters of Europe and America are spawned somewhere near the Sargasso Sea in the middle of the North Atlantic, whence they are distributed, as flat, more or less ribbon-like, transparent young, through the medium of the Gulf Stream and other oceanic currents.

The investigations are being conducted by the Department of Commerce, through the Coast and Geodetic Survey and the Bureau of Fisheries. Captain Charles C. Yates, of the former bureau, will be in command of the vessel, and the Bureau of Fisheries will be represented by Messrs. W. W. Welsh and John V. Greene. The entire cruise will probably occupy a little less than two months.

The Future of the Maryland Oyster Industry. The U. S. Coast and Geodetic Survey, which has participated in the work of the Maryland Oyster Survey, has just issued a "Summary of Survey of Oyster Bars of Maryland, 1906-1912," by C. C. Yates, giving concisely the history of the oyster industry of Maryland, a statement of its prospects, with charts, a diagram, index to natural oyster bars, index to triangulation stations, etc. With regard to the future of the industry the report says:

"It now seems not only reasonable, but probable, that within the next generation the citizens of Maryland will be leasing and cultivating a probable 100,000 and a possible 300,000 acres of so-called 'barren bottoms' where oysters do not now grow in commercial quantities; that the more than 200,000 acres of natural oyster bars now reserved for the use of the oystermen as a result of the Maryland Oyster Survey will be so conserved and developed that they will produce, as they have done before, twice the amount they now yield; that the oyster industry of Maryland will then be based on an annual production of 20,000,000 bushels of oysters where now it is barely 5,000,000; and that the physical valuation of the state-owned oyster lands will then be \$100,000,000, where now it is not more than \$20,000,000."

Publication of the 1:500,000 State Maps. Sixteen sheets have been published to date by the U. S. Geological Survey, namely: Alabama, Arkansas, Delaware, Georgia, Illinois, Indiana, Iowa, Michigan, Minnesota, Mississippi, Pennsylvania, New Jersey, Ohio, South Carolina, Tennessee and Vermont. These maps are published in black and white and are intended to serve as bases for geological, forestry, agricultural or other detail. They were described in the *Bull.*, Vol. 44, 1912, p. 841.

Archdeacon Stuck's Ascent of Mt. McKinley. *Scribner's Magazine* for November, 1913, contained Archdeacon Stuck's account of his ascent of Mt. McKinley. He had the cooperation of Mr. H. P. Karstens, without whose help, the Archdeacon frankly says, he would not have undertaken the enterprise. Their success in making the complete ascent (Professor Parker and Mr. Belmore Browne had earlier attained within about 100 feet of the top) appears largely to have been due to their forwarding the outfit by river in the previous autumn, so that their supplies were only fifty miles from the base of the mountain when they began their work in March, last year. Establishing at a base camp at 4,000 feet a cache of fresh pemmican, they found later that the suitability of this food could not be surpassed. They followed the route that the miners McGonogall and Anderson opened in 1910. This route was also adopted by Professor Parker. Archdeacon Stuck was able to substantiate the claim of the miners that they had ascended the mountain, though the summit reached by them was not the highest peak, but the secondary summit to the north. Stuck's party saw, through their glasses, the flagstaff which the miners had erected.

When the climbers reached the head of the Muldrow Glacier (11,500 feet), which drains the whole northern face of the mountain, they found that the north-eastern ridge separating the two branches of the glacier and offering the only means of ascent to the snow basin above had completely changed in appearance since Professor Parker was there. He described it as "a steep but practicable snow ridge." It was now, however, a jagged mass of rocks and ice, the transformation having been wrought evidently by the severe earthquake noted by the Parker party on their descent of the mountain.

This added greatly to the difficulty of the ascent. Each individual block had to be climbed over or circumvented. No space was found large enough to pitch a tent and it was necessary, therefore, to return each night to the glacier camp. Bad weather also caused delay; but when the ridge was at last surmounted bright sunshine favored the final climb, though the party was suffering from cold and the difficulty of breathing in the rarefied air. A mercurial barometer carried to the top gave a reading of 13.6 inches. Many of Archdeacon Stuck's descriptions are very realistic, especially that of the stupendous ice fall of 4,000 feet from the upper basin to the glacier below.

Archbishop Stuck pleads for the retention of the native name Denali for the great mountain. Why Denali rather than Bolshaya or Trayeyka, as it was also called? The mountain was first reported in recent time by Mr. Diekey, who estimated its height at 20,000 feet, within about 300 feet of its real elevation, and he expressed his opinion that it was the highest mountain in North America, as it is, according to our present knowledge. Bearing the name of our martyred President, which was given to it by the rediscoverer of the mountain, there is very little probability that it will cease to be known by the name it now bears on maps and in all reference books.

The Grand Trunk Pacific R.R. Nearly Completed. Regular passenger train service has begun on the Grand Trunk Pacific to Prince George, 1,279 miles west of Winnipeg. There now remains only a gap of 116 miles west of Prince George, and upon the completion of this stretch the whole system will be in operation from coast to coast.

SOUTH AMERICA

Population of Colombia. According to the census of Colombia taken on March 5, 1912, the population of the republic is 5,072,613, distributed among the departments as follows: Antioquia, 740,937; Atlántico, 114,887; Bolívar, 420,730; Boyacá, 586,499; Caldas, 341,198; Cauca, 211,756; Cundinamarca, 713,968; Huila, 158,191; Magdalena, 149,547; Nariño, 292,535; North Santander, 204,381; South Santander, 400,084; Tolima, 282,426; Valle, 217,159. About 300,000 persons living in the intendencias, comisarias and the government hospitals make up the remainder of the population.

AFRICA

New Port and Railroad for Nigeria. The *Geographical Journal* (Vol. 42, 1913, p. 398) says that a new trunk line is to be built from the Niger Delta to the Udi coal fields, east of the lower Niger in the latitude of Onitsha, a town on the river, thence to the Benue River, which will be crossed by a large bridge, and on along the border of the Bauchi Highlands to the Kaduna R., where it will be linked with the existing railroad to Kano. It will pass near the Bauchi tin fields, to which a branch line may be built. A particularly favorable site for the seaward terminus has been secured, it is said, through the recent discovery of a creek, apparently a branch of the Bonny R., with fifty feet depth of water at the shore edge. It will be possible here to build a town with wharves and railroad shops, and it is thought the port will become the coal distributing center for the whole of West Africa. The railroad will be 550 miles long and it will be four or five years in building.

The Harmattan of the Coast of Guinea. A paper on "The Harmattan Wind of the Guinea Coast," by H. W. Braby of the London Meteorological Office (*Quart. Journ. Roy. Met. Soc.*, Vol. 39, 1913), brings together the results of observations made at Zungeru, Northern Nigeria. It is significant that during the winter the notes in the "Remarks" column of the meteorological record at this station relate almost entirely to the harmattan. The importance of this wind is thus easily recognized. The harmattan blows intermittently during the winter (Nov.-March) along the coast of Upper Guinea, from French Guinea to the Cameroons. The wind is very dry, and carries a fine sand which comes through the crevices of doors and windows and covers everything with dust. While generally regarded as health-giving, its extreme dryness is trying to newcomers. Locally, the harmattan is known as "the doctor." The direction of the wind is northeast, which explains the presence of the Saharan dust, and it partakes somewhat of the nature of the föhn blowing from more elevated to lower districts. The stronger the wind the lower the relative humidity.

R. DEC. WARD.

The Egyptian Survey Department. A report of the Egyptian Survey Department published in 1913 records the work done during 1911. The third order triangulation for the cultivated area of Egypt was completed in 1911. Publication of the 1:50,000 sheets of the atlas of the cultivated area is advancing. A new 1:100,000 topographic series of cultivated areas with the adjoining desert to include the Nile escarpments was begun. This map is compiled for the Irrigation Service. The year was marked by special activity in the work undertaken by the Department to insure the steady development of Egyptian mineral resources. Meteorological and seismological observations as well as cadastral and town surveys were a part of the ordinary routine.

ASIA

The Identity of the Sangpo and the Brahmaputra Proven. A telegram from Calcutta on November 18 announced that Captain F. F. M. Bailey of the Political Department and Captain Morshead of the Survey of India had returned to India after successfully exploring the Sangpo. Their journey was an arduous one, but they conclusively proved that the Sangpo and Brahmaputra are one and the same river. This has for years been regarded as a certainty, but the fact had not actually been proven. The total distance traversed by the explorers is said to have been 1,700 miles, the travelers finally emerging at Dewangiri in Assam, after a journey of thirteen months from the first stop in the Mishmi country.

AUSTRALASIA AND OCEANIA

Professor Davis's Visit to Australia and Oceania. Professor W. M. Davis has received a grant from the Shaler Memorial Fund of Harvard

University for a journey across the Pacific, to examine the coral reefs of several groups of islands. He sailed from San Francisco on Feb. 11 for Honolulu, and goes thence to the Fiji Islands, where he will spend a month, then probably by Samoa and Tonga to New Zealand, where he will remain a month. In June he hopes to reach New Caledonia. August will be given to Australia, where he will be a guest of the British Association in Melbourne, Sydney and Brisbane. In early September he will take part in a supplementary meeting arranged by the Government of New Zealand. A stop will be made in the Society Islands during the return voyage, and San Francisco will be reached in November. His address is, care of Raymond-Whitcomb Co., San Francisco, Cal. (five cent postage).

The Crozet Islands Annexed by France. The French Government announces that it has formally annexed to the republic the Crozet Islands in the South Indian Ocean. This island group (46°-47° S. and 51° E.) was discovered by the French sailor Marion-Dufresne in 1772, who landed on the largest island of the group and took possession of it in the name of the King of France. The island upon which he landed is still known as Possession Island. Until now, the French Government has never asserted its authority over the islands. The group, of volcanic origin, includes three large and several small islands, of which the largest is about fifteen miles long and seven miles wide. It is a great resort of the albatross; and the hogs left there by seamen have largely multiplied. The most complete description of the islands was supplied in 1901 by the German South Polar Expedition under Drygalski. The islands are near the ocean route between Cape Town and Melbourne, a fact that has given them some importance. The best anchorage is in Ship's Bay, on the east side of Possession Island.

EUROPE

Dr. Keltie's Work for Geographical Education. The *Geographical Teacher*, Vol. 7, 1913, Part 3, p. 141, says that the Council of the Geographical Association has asked Dr. J. Scott Keltie, Secretary of the Royal Geographical Society, to be President of the Association for 1914. He has consented to take the office. The *Geographical Teacher* adds: "It is appropriate that he should be President next year, for it was in 1884—thirty years ago—that he was commissioned by the Council of the Royal Geographical Society to visit schools, training colleges and universities, both at home and abroad, and to report on the provision made for teaching geography in them. The publication of this report led to a revival of the teaching of geography in this country, and all who have attempted to improve this teaching are indebted to him not merely for this initial stimulus, but for constant advice and encouragement. The Council of the Association has asked him to review the progress made in the teaching of geography in this country since 1884, and we all look forward to an interesting and valuable address."

The Museum for Meereskunde in Berlin. This museum is planned to give an understanding of the sea and its phenomena, to exhibit the means of investigation and the abundance of marine life, and to set forth the economic and national significance of navigation, marine commerce and sea power. Its scope embraces the chemical and physical conditions and the movements of ocean waters. In a very elaborate fisheries collection, including many models of ships and apparatus, the methods of winning the treasures of the sea are placed before the eye, and sea products in striking variety are displayed. An historico-economic collection is devoted to shipbuilding, navigation and sea commerce, to harbors and rescue appliances. Another department illustrates the history and development of the German navy.

The museum was founded by Professor von Richthofen, but in recent years has been greatly expanded under the administration of the present Director, Professor Albrecht Penck. It is situated quite near the Royal Library and the central building of the University. Under the same roof, and also under the direction of Professor Penck, is the Geographic Institute of the University.

A formal opening of the enlarged and reorganized museum was held on Saturday, December 6. Many geographers, naval officers and members of the imperial government were present. The principal address, by the Director, was followed by a short response by Kultusminister v. Trott zu Solz, who spoke appreciatively of the development and public value of the museum. The collections are rich in variety and interest and will do good service both in popular education and as an adjunct in special geographical training.

A. P. BRIGHAM.

Lightning Conductors on St. Paul's Cathedral, London. During the recent installation of new lightning conductors on St. Paul's Cathedral, London, there was discovered part of one of the original bar conductors erected about 140 years ago under the supervision of Benjamin Franklin. This bar was inside one of the towers, and was thus not exposed to the weather. The *London Times*, commenting on the discovery of this old lightning rod, said: "The fixing of the 'Franklin rods,' as they were called, led to a heated controversy as to whether lightning conductors should have points or balls as terminals. The President of the Royal Society, who advocated points, had to resign. King George III was a strong adherent of ball terminals, but time confirmed Franklin's view."

R. DEC. WARD.

Congrès International d'Ethnologie et d'Ethnographie This congress will meet at Neuchâtel, Switzerland, on June 1-5, 1914, under the active presidency of Professor Gustave Jéquier, Professor of Egyptology in the University of Neuchâtel. The official languages of the congress will be French, German, English and Italian. The length of papers is limited to twenty minutes, and the price of membership in the congress has been fixed at ten francs.

OCEANOGRAPHICAL

Ocean Fleets of the Nations. B. Huldermann's "Geschäftslage und Entwicklung der Seeschifffahrt," (Mittler & Sohn, Berlin, 1913) contains the following table giving a comparative view of the tonnage of ocean-going vessels as distributed among the leading sea powers and over a series of years:

IN 1000 GROSS REGISTERED TONS

	1890	1900	1905	1910	1911	1912
World fleet.....	22,152	29,044	36,001	41,915	49,147	44,601
Belonging to:						
Great Britain with Colonies...	11,597	14,361	17,010	19,012	19,419	19,874
United States.....	2,053	2,638	2,649	2,762	2,809	2,849
Austria-Hungary.....	270	416	618	779	846	903
Denmark.....	280	519	628	737	753	753
The Netherlands.....	379	530	702	1,015	1,058	1,130
France.....	1,045	1,351	1,728	1,882	1,977	2,053
Germany.....	1,569	2,650	3,565	4,333	4,467	4,629
Italy.....	817	984	1,189	1,321	1,341	1,399
Japan.....	172	575	874	1,149	1,203	1,345
Norway.....	1,584	1,641	1,776	2,015	2,154	2,203
Russia.....	427	721	863	885	865	987
Spain.....	535	695	723	767	776	772
Sweden.....	476	637	864	917	931	970

The Work of the Oceanographical Section of the Deutsche Seewarte. According to the last annual report of the Deutsche Seewarte of Hamburg, the Oceanographical Section, which was founded on April 1, 1912, engaged in the following activities during the past year under the direction of Dr. G. Schott: (1) an investigation of the specific gravity of the water in German harbors and estuaries; (2) completion after ten years of the work

on the Atlas of the Currents of the Indian Ocean, which will comprise 24 plates; (3) the preparation of maps and diagrams from the oceanographical observations of the cruise of the *Möwe* to German Southwest Africa in 1911; (4) courses of instruction in oceanography; (5) the grant of subsidies to L. Mecking of Göttingen (now of Kiel) and R. Lütgens of Hamburg for research; (6) critical examination of several sheets of the *Carte Générale Bathymétrique des Océans*, issued under the auspices of the Prince of Monaco; (7) inception of studies, designed to cover a long period, for the preparation of an Atlas of the Currents of the Atlantic Ocean, beginning with an examination of the leeway records of sailing vessels deposited in the archives of the *Seewarte*; and (8) continuation of the collecting of surface temperatures of the North Sea for the *Bureau du Conseil International pour l'Exploration de la Mer* in Copenhagen (*Petermanns Mitt.*, Nov., 1913, p. 266).

PERSONAL

Mr. James I. Craig has been transferred from the Directorship of the Meteorological Section of the Survey Department, Cairo, Egypt, to the Comptrollership of the General Statistical Department. His successor in the Meteorological Section is Mr. H. E. Hurst.

Professor W. M. Davis of Harvard University has lately returned from a month in England and Ireland. He gave four lectures before the School of Geography at Oxford on "The Principles of Geographical Presentation," and addressed the Junior Scientific Club of Oxford University and the Sedgwick Club of Cambridge University on "Theories of Coral Reefs." In Dublin he gave three lectures in the Royal College of Science on certain problems in physical geography, illustrative of the explanatory method of geographical description. At Wellington and at Winchester "colleges"—public schools of the English type—as well as at Oxford, Cambridge and Dublin, he repeated his illustrated lecture on "The Lessons of the Colorado Canyon." During a brief visit to Paris he saw four of the French members of the Transcontinental Excursion of 1912, and received from them a beautiful album containing portraits of the European members.

Mr. Douglas Freshfield, the distinguished alpinist and Vice-President of the Royal Geographical Society, called at the house of our Society on December 12. He spent a few days in New York and was ending a trip around the world, crossing North America from west to east.

Dr. W. Hunter Workman and Mrs. Fanny Bullock Workman read papers before the Royal Geographical Society on November 24, on their exploration of the Siachen or Rose Glacier in the Eastern Karakoram in 1913 and their discovery of the peak 24,350 feet high which has been named after the Queen of England.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Au Pays des Peaux-Rouges. Six ans aux Montagnes Rocheuses. Monographies indiennes. Par P. Victor Baudot. 238 pp. Ills. Soc. Saint-Augustin, Lille, 1911. Fr. 1.50. 10 x 6 $\frac{1}{2}$.

An amusing feature of this work is not fairly to be charged to the author. Manifestly his publisher was in possession of a stock of old wood cuts and employed them somewhat at random for illustration. Father Baudot began his six years' missionary labor in the Rocky Mountains no longer ago than 1902. He illustrates the arrival at New York with a picture of the Sixth Avenue Elevated operated with the once familiar little engines. To exhibit railroad travel there is a Pullman diner of an early epoch. The sketches of Father Baudot's service among the Indians are merely a trifle. Of greater value is a monograph on the Blackfeet translated from the Italian manuscript of Father Prando which contains some important information. A similar essay on the Cœur d'Alenes has been translated from the Italian of an anonymous priest in the "Civiltà cattolica." These two form a valuable contribution to the ethnology of the two tribes and it is a fortunate chance that has brought them together for permanent preservation where they can be accessible to students.

WILLIAM CHURCHILL.

Baltimore, Its History and Its People. By various contributors. Clayton Colman Hall, General Editor. Vol. 1: History. 721 pp. Map, index. Vol. 2: Biography. 488 pp. Vol. 3: Biography. 489-936 pp. Ills., index. Lewis Historical Publishing Co., New York, 1912. \$25. 3 vols. 10 x 7.

The history of the city fills the first volume and is a useful compilation. The two other volumes are given to biographies with portraits of men who have had a part in the upbuilding of the city.

Early Days in Kansas. In Keokuk's Time on the Kansas Reservation. Being various incidents pertaining to the Keokuks, the Sac & Fox Indians, (Mississippi Band), and tales of the early settlers, life on the Kansas Reservation, located on the headwaters of the Osage River, 1846-1870. Green's Historical Series. 68 pp. Ills. Charles R. Green, Olathe, Kansas, 1913. 50 cents. 8 $\frac{1}{2}$ x 6.

Homely and unpretentious records of pioneer days on the frontier of white settlement. A worthy addition to the chronicles of that time.

The Indians of the Terraced Houses. By Charles Francis Saunders. xx and 293 pp. Map, ills. G. P. Putnam's Sons, New York, 1912. \$2.50. 8 $\frac{1}{2}$ x 5 $\frac{1}{2}$.

So far as this book is narrative it will be read with great pleasure, for the Indians of the pueblos in New Mexico and Arizona have always possessed an interest far greater than the nomads of the prairies. In their culture we find the beginning of a social economy which exhibits the aboriginal of this land as advancing toward a higher social level. Mr. Saunders has visited all the inhabited pueblos and has given the notes of his personal impressions. He does not pretend to the careful investigation bestowed upon the sedentary Indians by Cushing and Bandelier, to mention but two in a small and distin-

guished group of ethnologists. In fact his observations are essentially cursory and at times trivial, yet none the less they will serve the useful end of introducing Hopi and Zuñi and Moki to those who might otherwise remain in ignorance but who through this introduction may be led to continue the study in the better material which the Bureau of American Ethnology has made available in rich measure. When, however, he turns to comment upon the present system of Indian education in the pueblos he enters debatable ground. It is probably quite true that government schools are altering the life of the pueblos and that there is a loss of picturesque value in the course of progress. The best friends of the Indians will hold that mere picturesque value may properly be sacrificed for more wholesome surroundings in the community homes and that the undeniable industry of these Indians will be productive of better results when intelligently directed.

WILLIAM CHURCHILL.

Greeks in America. An Account of their Coming, Progress, Customs, Living and Aspirations. With an historical introduction and the stories of some famous American-Greeks. By Thomas Burgess. xvi and 256 pp. Ills., index. Sherman, French & Co., Boston, 1913. \$1.35. 8 x 5½.

Thirty years ago there were scarcely any Greeks in the United States; to-day, over 250,000 of them are here. But though they left their homes to come here, yet love for their native land burned strong within them as is shown by the fact that from 40,000 to 50,000 sailed from America to join their countrymen in the Balkan War.

Mr. Burgess tells briefly the story of Greece; refers to the various ways in which Greek immigrants to this country earn money; describes the Greek societies, newspapers, books, families, schools, celebrations and rites, the daily life of the Greek in our large cities, mill towns, and western states; and lastly gives a sketch of Michael Anagnos, and other Greeks who have become famous in America.

The author says the idea is erroneous that the Greek comes here merely to earn money and then return home. He says that the Greek immigrant, even though he may revisit his native land, will eventually return to America. Mr. Burgess makes some suggestions as to what to do for and with the Greek immigrant. A table gives, by states and cities, the approximate number of Greeks in the United States, and there is a bibliography of the best books in English on modern and medieval Greece and on Greeks in America.

WILBUR GREELEY BURROUGHS.

Highways and Byways from the St. Lawrence to Virginia. By Clifton Johnson. xi and 340 pp. Ills. The Macmillan Co., New York, 1913. \$1.50. 8 x 5½.

The rural life of the country is vividly described, both by the author and by means of conversations which he reports verbatim in the local dialect. These conversations help us to understand the mannerisms, customs, modes of living, legends and superstitions of these people. Appended to each chapter is a brief descriptive and historical account of places of scenic and historic interest, with directions how to reach them; also, a statement of the condition of the roads relative to motoring, distances from points of interest to near-by cities, etc. The book should be of value to all who are planning vacation trips either by rail, or motor.

WILBUR GREELEY BURROUGHS.

Le Juif Errant d'Aujourd'hui. Étude sur l'émigration des Israélites de l'Europe Orientale aux États-Unis de l'Amérique du Nord. Par L. Hersch. 331 pp. Diagrams. M. Giard & É. Brière, Paris, 1913. Fr. 6. 9 x 5½.

It is well that this timely essay upon one of our social themes comes to us from a student who can bring an unbiased mind to the source and to the destination of the great Jewish migration of the present. It amounts to a great folk movement, its causes in social conditions of eastern Europe, its result a great economic problem in American communities. Upon this ultimate of the theme Dr. Hersch makes little comment. His work is concerned with the movement at its several sources, he examines its causation in careful detail,

he records the fluctuations and discloses the reasons therefor. The value of the work is that he brings the objects of his study as far as Ellis Island, where we shall have to make a disposition of the material. For the richer knowledge of this particular class of future citizenship, an immigration which comes to stay, our students of social problems will turn gladly to this work as a standard handbook. The treatment is particular where tables and detailed statements are seen to serve the end of a data supply, but it is broad in a wide view of history and political economy, a very valuable and wholly interesting treatise on a theme which we are forced to study in our own civic life.

WILLIAM CHURCHILL.

The Old Boston Post Road. By Stephen Jenkins. vii and 453 pp. Maps, ills., index. G. P. Putnam's Sons, New York, 1913. \$3.50. 9 x 6½.

The habit of mind which has given their great value to earlier works by Mr. Jenkins may, in the most kindly sense, be described as parochial. He was essentially an antiquarian, indefatigable in his research into the affairs of the little district about his home. It is just because of this parochialism which gave the charm to his studies of Broadway and the Bronx that this volume falls far below the level of its predecessors both in interest and in value. Hitherto he has been dealing with distances of a few miles, such as could be covered by a leisurely nag ambling along familiar roads and sure of the home stable at night. Here he essays the greater distance and it proves too much for the method. There is much interesting antiquarian material about the main highway between New York and Boston; it would enliven a less entertaining volume just to have the extracts from Madam Sarah Knight and her comment that "I made but one Grone, which was from the time I went to bed to the time I Riss." But when he has passed Stratford and gets into the unfamiliar country of the Yankees the personal acquaintance vanishes, and with it goes the peculiar charm of his writing.

CENTRAL AMERICA AND WEST INDIES

Die mittelamerikanischen Vulkane. Von Karl Sapper. 173 pp. Maps, index. *Ergänzungsheft No. 178 zu Petermanns Mitt.* 1913. Mk. 12. 11 x 7½.

This is a comprehensive general report upon the volcanoes of Central America by the eminent German volcanologist, whose personal study of the region has extended over twelve years and included reconnaissance examination of nearly all important vents of the region. Not only his own data but those of all other workers are made use of in this summary report. The first part (127 pages) is devoted to detailed descriptions of the individual volcanoes; the remaining 45 pages, which compose part II, being given over to a general treatment of the subject.

As regards the distribution of the Central American volcanoes, Professor Sapper finds that they are arranged upon fissures, and that of the 101 volcanic mountains and *Maare* of the first order, the majority range themselves in beautifully expressed series which are parallel to each other and nearly parallel to the nearby coast of the Pacific ocean. To the southward, however, certain volcanoes fall in a distinct class connected with mountain arcs of the Pacific type to which they are parallel. Excepting this class, the Central American volcanoes, as already stated, are found in long, nearly parallel lines, which instead of being perfectly straight, are made up of zig-zags, or else they fall in short transverse lines nearly at right angles. The individual series are offset *en échelon* and throughout in the same sense. This peculiarity of regular arrangement taken in connection with results of his earlier studies of the eruption and earthquake of Santa Maria in 1902, leads Sapper to believe that this eruption was due to the sinking of a local block of the earth's shell, and that the group of Central American volcanic vents have been opened along the margins of similar blocks which have undergone settlement in succession, though separated by considerable time intervals. The order of settlement is believed to have been from the southeastern blocks toward the

northwestern. The faults which separate the blocks of the system are believed to have been formed without control by the more ancient faults of the region. This conclusion has much in common with views which have been held concerning the movement of blocks of the earth's crust within the Great Basin of the western United States (Clarence King), and in Iceland as well (Thoroddsen).

The greater number of Central American volcanoes are cinder cones often with deep radial barrancones whose present shape and magnitude are believed to express the result of some decades of erosion. Upon the flanks of the larger cones there are, however, in many cases, parasitic cones, and these are seldom arranged in straight lines and apparently never along radial lines. Many of the larger volcanoes, in common with those of Mexico, show in place of true parasitic cones, a larger or smaller number of cones of much the same dimensions which do not rest upon the flanks of the principal mountain but are found in its vicinity. Being obviously in causal association with the larger mountains these smaller satellites are described as "companion volcanoes" (*Begleitvulkänchen*). Whenever a strong wind was blowing during an eruption the parasitic cone which has resulted has attained a greater height upon the windward (western) side and the projectiles have been carried much farther to leeward.

Outflow of lava has played a large rôle in the formation of many volcanoes, and these composite cones upon being dissected by erosion present the lava flows as great ribs which stand in relief. If the main crater wall is found ruptured in more than one place, the breaks are generally two in number, opposite and in the direction of the longer axis of the cone.

Maars, the exceptionally low and broad craters, are especially numerous in Central America, but whether they are due to explosive eruptions or to infall, Sapper has been unable to determine.

As regards the materials exuded or ejected, these are found to be for the most part andesites and basalts, the latter generally a later product. Quartz, porphyry, diabase, porphyrite, and dacite become important in Nicaragua.

The great backbone of mountains and the blanketing masses of andesite, rhyolite and basalt in Central America are to be regarded as the products of gigantic fissure eruptions which took place in Tertiary and particularly in Oligocene times. The more modern eruptions in Central America began in the Quaternary and developed successive periods of culminating intensity. In Nicaragua particularly these have resulted in important changes in the coast line, in the stream net-work, and in the surface relief of the country; though the modern period of activity must be accounted as small in comparison with that of the Tertiary, and the historic eruptions as relatively few in number. The paper closes with a valuable chronological list of the volcanic and seismic phenomena which are on record for the Central American region, this list being expanded from that of de Montessus.

WILLIAM HERBERT HOBBS.

History of the Discovery and Conquest of Costa Rica. By Ricardo Fernández Guardia. Translated by Harry Weston Van Dyke. xxi and 416 pp. Maps, ills., index. T. Y. Crowell Co., New York, 1913. 8½ x 6.

The stories of Spanish conquest in the new world bring to light characters who met the ordeals of the strange land with fortitude. While now and then a leader turns out a rascal, the heroic and the just outnumber the degenerate, and histories of the various periods of expansion are inspiring. This is particularly true of this account of the early settlements in Costa Rica: The author has delineated the characters and lives of many brave conquistadores of the sixteenth, seventeenth and eighteenth centuries. The opening chapter gives a brief account of the geography of the land and prepares the reader for the strife of conquest by accounts of the five indigenous races which though never large in number were able to harass the Spaniard for three centuries. Then follows the story of a great array of Spanish leaders who in one way or another, inspired by high ideals or a lust for gain, penetrated this unpromising land to the south.

ROBERT M. BROWN.

SOUTH AMERICA

Die Cordillerenstaaten. Von Dr. Wilhelm Sievers. Sammlung Göschel.

1. Bändchen: Einleitung, Bolivia und Perú. 148 pp. Maps, illus., index.
2. Bändchen: Ecuador, Colombia und Venezuela. 123 pp. Maps, illus., index. G. J. Göschen, Berlin, 1913. 90 pf. each. $6\frac{1}{2} \times 4\frac{1}{2}$.

Professor Sievers has done a painstaking piece of work in regional geography in these two volumes on the countries of the South American Cordillera. The extremely fine print of a large part of the first volume leaves the reader's eyes and patience almost exhausted, and is not a dignified form in which to cast such good results. One cannot find elsewhere so judicious and at the same time so clear a treatment of Bolivia and Peru, the two countries, which, with Venezuela (an old field of work for Professor Sievers), get the lion's share of the space.

After a brief general description of a country, there are compact explanations of the physiography and climate of each natural region. Then follow excellent summaries of the effects of these physical conditions upon the vegetation and the people. These summaries reflect the author's wide reading, as well as his familiarity with both physical and anthropogeographic principles. To take a few illustrations. There is in no English book so excellent a description of the zone of vegetation on the coast of Peru, between 8° and 18° south latitude, in the so-called "Lomas" belt. Yet it is one of the most important and certainly one of the most fascinating features of Peru, set, as it is, between an upper and a lower desert. One may ride, as did the reviewer, from the upper "pampa" (in some places from the mountains) into the coast range and down into the zone of rains, 2,000-5,000 feet above the sea, and come out again into the lower desert, in less than three hours. From barren sand into luscious wild clover, knee-high; from warm, dry air to cool, saturated air and heavy showers; from a blazing sky to clouds and dense fogs—these are the contrasts between the Lomas and the belts of country on either hand.

Of similar character are Professor Sievers' distinctions between the forested Beni country in northern Bolivia and the country of the Missions farther south where grassland and forest alternate. There are many such illustrations of the thorough scholarship of the author. Where else than in Germany could one have all this published for less than twenty-five cents? The series of which these tiny volumes form a part deserves to be well known among the growing number of American geographers to whom German is no longer a convenience but a necessity.

ISAIAH BOWMAN.

AFRICA

Die deutschen Schutzgebiete in Afrika und der Südsee 1911-1912.

Amtliche Jahresberichte, herausgegeben vom Reichs-Kolonialamt. xvii and 370 pp. E. S. Mittler & Sohn, Berlin, 1913. Mk. 11.50. 11×7 .

This official compilation has two merits worthy of note in connection with public statistics: 1: It is promptly issued, and this means that the figures are available while yet valuable. 2: The tables have been carefully digested for use. They are all summation records and comparisons with the summations of preceding years; they are the aggregate figures of population, justice, education, agriculture, trade and communications. They are logically presented for East Africa, Kamerun, Togo, German Southwest Africa, German New Guinea and Samoa. For each of these colonies there is a brief introductory essay setting forth the activity of the year for which the report is made. The soundest commentary which can be made upon this report is that it is entirely contained in 370 pages, practically a page a day for the record of a year of a great and widely extended empire.

La France en Afrique. Par Edmond Ferry. 301 pp. Armand Colin, Paris, 1905. Fr. 3.50. $7\frac{1}{2} \times 4\frac{1}{2}$.

The policy of the French in African colonization is the theme of this book. The author first reviews the advent of Napoleon in Africa and describes his diplomatic and crafty scheme of winning Africa for France by a seeming

deep interest in the religion of the country. It is inferred that the present plan of making headway for France in the country is based on the plans of Napoleon in 1798. The general characteristics of the area, the distinctive traits of the nomad population, the plan of interesting the inhabitants in works of improvement, the task of reconciling all acts to the religion of the natives and especially the difficulties with the inner court of Mohammedanism, the Senoussi, are subjects which the author carefully discusses; and the principles which the French are planning to follow as the basis of their civilizing work in Africa are stated.

ROBERT M. BROWN.

Hunting the Elephant in Africa, and Other Recollections of Thirteen Year's Wanderings. By Captain C. H. Stigand. With an Introduction by Colonel Theodore Roosevelt. xv and 379 pp. Ills., index. The Macmillan Co., New York, 1913. \$2.50. 9 x 6.

The title is not exactly adequate, for the book treats not only of elephant hunting but also of the rhinoceros, lion, buffalo, and bongo (a large antelope), with hints on camping and chapters on African rivers and swamps, native servants, hunting incidents, African sayings and ideas, African insects and some other topics. The work will take its place among the best of hunting books. The author is a distinguished and experienced Nimrod and field naturalist; few others have his large experience and his book is full of suggestions for other hunters. He does not pin full faith to the doctrine of protective coloration and shows that it does not play the smallest part in concealing most of the big game of Africa from their foes.

L'Oasi di Ghat e sue Adiaccenze. Di Capitano Bourbon del Monte Santa Maria. 178 pp. Maps. Unione Arti Grafiche, Castello, 1912. 7½ x 5.

L'Islamismo e la Confraternita dei Senussi. Di Capitano Bourbon del Monte Santa Maria. 247 pp. Map. Unione Arti Grafiche, Castello, 1912. 7½ x 5.

The information in the first book is of a geographical and military character. The region is shown in the state in which the Turks abandoned it, and the difficulties of the Italians in attempting to restore order patterned on European ideas are mentioned.

The second contains an account of the origin and growth of the order of the Senoussi and its relation to Islam. The writer seems imbued with the spirit prevailing in French colonial circles where alleged anti-European or anti-Christian doings of the order are exaggerated, often for political purposes. He would have been nearer the truth had he tried to show that the order need not be considered a menace to the expansion of European dominion in Africa. The case of Egypt can be adduced as an example. An instructive map shows the distribution of Senoussi centers in Northeastern Africa.

LEON DOMINIAN.

Notes Ethnographiques sur les peuples communément appelés Bakuba, ainsi que sur les peuplades apparentées. Les Bushongo. Par E. Torday et T. A. Joyce. Maps, ill., index. 291 pp. *Ann. du Mus. du Congo Belge*, Tome 2, Fasc. 1. Falk fils, Brussels, 1910. 14 x 11.

We have here a very detailed and careful study of the Bushongo race of the Belgian Congo as manifested in one of its ramifications, the Bakuba people. Rigidly pursuing a method which makes for great accuracy of observation he has written in this report a record of the people which will leave scant gleanings for those who come after. While giving deserved praise to the definitely ethnological work in this volume it is permissible to record a note upon the linguistic collections. There is presented a very large mass of vocabulary material of the Bushongo and the Lumbila arranged after the usual manner. When we reflect upon the great strides made in ethnography, largely by reason of the Cambridge system of learning what to observe, we must feel that the time is ripe for a similar syllabus of the

system of languages below the inflected class so that it may be made possible to coordinate the large mass of vocabularies. Nothing can be more clear than that these vocabularies result in clouding confusion so long as the collectors are wholly untrained in the grammatical life of the speech of isolation and agglutination.

WILLIAM CHURCHILL.

Anthropological Report on the Ibo-Speaking Peoples of Nigeria.

By Northcote W. Thomas. Part I: Law and Custom of the Ibo of the Awka Neighbourhood, S. Nigeria. 161 pp. Maps, ills., index. Part II: English-Ibo and Ibo-English Dictionary. vi and 391 pp. Part III: Proverbs, Narratives, Vocabularies and Grammar. vi and 199 pp. Harrison & Sons, London, 1913. 9 x 6 each.

These volumes, with the companion study of the Edo (*Bull.*, Vol. 44, p. 697) by the same author, illustrate the growth of the difference in European attitude toward the affairs of Africa. From the same region we note the first essay toward the comprehension of the African, the slim pamphlet published in Boston under mission auspices more than two generations ago, the grammar and vocabulary of the Yoruba. Ibo and Edo are now seen to be rather considerable language groups included within the area formerly classed as Yoruba, and so far as we may determine from the evidence which Mr. Thomas has presented in these very satisfactory dictionaries, the differences between Ibo and Edo on the one hand, and on the other between these languages of the lower Niger and the true Yoruba of its upper course, are far greater than may be assigned to dialectic variety. As in the case of his former study of the Edo we are impressed by the author's caution in his record of Ibo life and custom. In every note of manner and custom he is sedulous to differentiate that which he has seen, the interpretation which he makes of the thing seen, the explanation which he has received from his Nigerian companions and a further comment upon the evidential value of such testimony. The method does not make for a smooth and entertaining narrative, in fact the result is remarkably arid; but the veracity of these notes is so highly substantiated as to serve as the best apology for the absence of pictorial value. Students of folk lore will find in one of these volumes a great treasure of animal life. The principal hero is the tortoise, but the myth series is clearly of that kingdom of sentient beasts which has been introduced to this country by servile Africans and which only lately has been considered worthy of collection and study.

WILLIAM CHURCHILL.

ASIA

Studies on the Vegetation of the Transcasian Lowlands. By

O. Paulsen. The Second Danish Pamir Expedition. Conducted by O. Olufsen. 279 pp. Map, ills. Gyldendalske Boghandel, Copenhagen, 1912. Kr. 4. 10 x 7.

Work of this character passes far beyond the botanical record upon which it is based. It is really the study of the vegetal control of secular geographical mutation. It is regarded as so important that one of the major projects of the research authorized by the Carnegie Institution is the maintenance of a desert laboratory in Arizona and the conduct of expeditionary investigation in the more characteristic desert formations of the world. We prefer to examine this interesting treatise in reference to this phase of geographical study. Transcasia is a margin of that central Asian desert which we find reason to believe has been for centuries advancing upon the area of filth. In several recent works such as Sir Aurel Stein's "Desert Cathay" and Tate's "People of Seistan," we have abundant evidence that man recoils from the struggle with the aeolian advance of the desert; the whole theme has been carefully treated by Ellsworth Huntington in his study of desiccation which, debatable in some details, is commonly accepted in general. Here we find the direct evidence of the struggle of nature to resist the march of the desert, the development of resistant qualities in vegetation which may cope with desiccation and the loss of humus, the root search for water of the underflow

and stem toleration of the efflorescent salts, the binding of shifting masses of sand. In so far as the agencies at work are vegetal this work is botanical, but in the result accomplished the work is a close study of the factors which establish geographical land forms.

WILLIAM CHURCHILL.

An Outline History of China. Part 2: From the Manchu Conquest to the Recognition of the Republic, A.D. 1913. By Herbert H. Gowen. 216 pp. Index. Sherman, French & Co., Boston, 1913. \$1.20. 8 x 5½.

As noted in the review of the former volume (*Bull.*, Vol. 45, p. 695) Professor Gowen selected the fall of the Ming dynasty in the middle of the seventeenth century as the demarcation between ancestral and modern China. In this final volume is embraced the whole span of the Manchu empire from the accession of the infant Shun Chih to the downfall of the infant Pu Yi. From its start to its finish the Manchu hold upon the dragon throne has been the feeble clutch of baby hands, the real rule has been exercised by palace favorites and scheming captains of a turbulent military. Regarded as a whole, the plan of the work is excellent, it outlines the history of a large yet never great empire, it furnishes the framework upon which the student may adjust the greater works which deal with episodes of Chinese history.

Die chinesische Weltanschauung. Dargestellt auf Grund der ethischen Staatslehre des Philosophen Mong-dse. Von Heinrich Mootz. x and 205 pp. Ills. Karl J. Trübner, Strassburg, 1912. Mk. 4. 8 x 6.

The Mong-dse of the title is better known under his latinized designation of Mencius, the successor of Confucius. The propriety of sacrificing such little stock of information as exists in Caucasian minds associated with the name Mencius merely to conform with one of the Chinese vernaculars is problematical. If the same effort were made in the case of Melancthon and Erasmus we should consider the loss irreparable. The author in addressing a popular audience has dealt very wisely with the philosophy of Mencius, essentially a homespun thinker offering rules of propriety to a people whose instinct has crystallized through ages of such teaching to a passion for self-control in the mass. He has selected with no little care the most characteristic of these apothegms, has translated them with considerable appreciation of their social value and has added comment to each group of dicta which shall serve to express the passage from the sometimes cryptic aphorism to its employment in the affairs of life and their good conduct. Of course there is much in the philosophy of Confucius and Mencius which escapes our sympathy even if we may acquire it in rather cold comprehension, but Mr. Mootz has selected for this volume only those rules of life which manifest a strong appeal to our common humanity. The result is quite satisfactory as an introduction to the manner of Chinese thought.

WILLIAM CHURCHILL.

K'eng Tshi T'u. Ackerbau und Seidengewinnung in China. Ein kaiserliches Lehr- und Mahn-Buch. Aus dem Chinesischen übersetzt und mit Erklärungen versehen von O. Franke. vi and 194 pp. Ills., index. *Abhandl. Hamburg. Kolonialinst.*, Vol. 11. L. Friederichsen & Co., Hamburg, 1913. Mk. 20. 12 x 9½.

We have here a very sympathetic handling of one of the great Chinese classics whose history is traceable to the middle of the twelfth century. Dr. Franke presents the Chinese text with a clear translation and a reproduction of the traditional pictures. In itself a great and valuable work the author has added a wealth of critical and illustrative material which amply serves to introduce this important work to the Occidental mind with an appreciation of the part which it has played in developing the culture of China. Thrift is but the first of the virtues which it inculcates, the wise use of all the materials which are ready to hand, the correction of waste. It teaches by daily lessons the value of industry and the importance of working early and late. Text and picture show the part which each one in the household must perform in the field and in the warm room where the silkworms hatch and spin; the children are taught what service they must render to lighten the work of those

a little older, the active workers deriving help from the younger turn the product of their family labor over to the patriarch who shall turn this product in the market to the profit of the family. And with what period of our own culture does this highly organized community life correspond? In the middle of the twelfth century cultivation in England was so little developed that the land was always at the edge of dearth, and famines in poor seasons carried off thousands, wolves ravened up to the gates of London and York and destroyed kine and men.

WILLIAM CHURCHILL.

Five Years in Unknown Jungles for God and Empire. Being an account of the Founding of the Lakher Pioneer Mission, its work amongst (with Manners, Customs, Religious Rites and Ceremonies of) a wild, Head-hunting Race of Savage Hillsmen in Further India, previously unknown to the Civilized World. By Reginald A. Lorrain. xii and 264 pp. Map, ills. Lakher Pioneer Mission, London, 1913 (†). 5s.

The small sum of geographical information supplied may be found in the rough sketch map. The Lakherland, where the author established his mission, lies in Farther India inland from Arakan and practically occupies the whole of the great bend of the Kolodyne River. The book has been written to secure funds for the prosecution of the work which the author assumed without the sanction of any of the regular mission establishments of Great Britain. The appeal seems addressed to a particularly simple form of religious life, for the author certifies to his divine call to this wild field by reciting his success with the *sortes biblicae*, against which, if we recall correctly, there is a law on the statute rolls of Great Britain. It may be recalled that among the Christians of the Middle Ages the Bible was often opened at random or by a pin inserted between the pages, and the first passage striking the eye was accepted as a special message. Such chance selections were called *sortes biblicae*.

The Pagan Tribes of Borneo. A Description of Their Physical, Moral and Intellectual Condition with some Discussion of Their Ethnic Relations. By Charles Hose and William McDougall. With an appendix on the physical characters of the races of Borneo by A. C. Haddon. Vol. 1: xv and 283 pp. Vol. 2: x and 374 pp. Maps, ills., index. Macmillan & Co., London, 1912. 42s. 9 x 6.

The designation pagan is used in contradistinction to Mohammedan in this work. Ethnically the reference is particularly to the Kayans, the Kenyah, the Klemantans, the Ibans or Sea Dyaks, and the Punans of the interior. Geographically we find these peoples established in North Borneo and Sarawak, the north-western face of the island. Dr. Hose in particular has a most intimate acquaintance with the people of his study, for he has served a quarter of a century in the civil administration of Rajah Brooke. The second author, Dr. McDougall, came to Sarawak as a member of the Cambridge Torres Straits Anthropological Expedition; therefore he brought to the elaboration of his fellow author's material a technical training in anthropology which proves of value in standardizing the more intimate observation derived from daily life in contact with the pagan tribes.

I have expressed the opinion before as to the anthropological training in England now in fashion. It does seem that there is too great proof of the somewhat mechanical effort to reduce all rude life to rigid conformity with Frazer's "Golden Bough." In the hands of mere pupils this effort deadens freedom of thought. In England, particularly in Cambridge, each anthropologist seems, with a slight variation upon a classic phrase, *unius addictus in verba jurare*, and that one Frazer. However, the vigor of the senior author's intimacy with these tribes, even the shy Punans of the inner mountains, serves largely to correct the result which might have been expected and which in several chapters does appear. The two volumes are crowded with the most interesting details and we must be thankful that it has been possible to preserve such a record before the old life had been civilized out of existence. Dr. Hose insists so earnestly upon one detail of Borneo life that it is only fair to carry on the substance of his note upon a point which has moved him to righteous wrath in behalf of maligned savages. He wishes the world to

know, despite current opinion most recently voiced by Keane, that the young ladies of Borneo do not ask of their swains that they earn their favors by bringing home fresh heads in a basket. The heads, it appears, are brought home, but not for the girls. Where so much is excellent, so much is wholly new, and where we acknowledge with lively satisfaction an interest maintained unflinching through 600 pages and 200 magnificent pictures, it may seem ungenerous to offer an adverse suggestion. Many of the observations are worked out to the most minute detail, yet the observers seem to have neglected the interpretation. For example, the tattoo. There is an enormous mass of detail, the life history of the design has been gathered from the tattooed by the elder author and studied out by the other in conformity with Dr. Haddon's theory of the evolution of ornament. Yet neither seems to have recognized that the design is both indicative and decorative of that function of life which is among the savages a dominant instinct. WILLIAM CHURCHILL.

Gennem Wahhabiternes Land paa Kamelryg. (Through the Country of the Wahhabitues on Camel's Back). Af Barclay Raunkjær. 304 pp. Maps, ill., index. Gyldendalske Boghandel, Copenhagen, 1913. 8½ x 6.

In the winter of 1911-1912, Mr. Barclay Raunkjær went through Eastern and Central Arabia, mostly on new tracks, from Koweit by Bereidah, Riadh and Hofuf, reaching Adjer on the Persian Gulf in April, 1912. The land is divided in long belts, stretching NW-SE. A low rolling desert plain with some "mesas" of sandstone extends along the Persian Gulf. To the west it is bordered by a sandstone plateau, 90 miles broad. This stony desert passes westward into a belt of sand-dunes, 20 miles broad. Then follows the Central Arabian highland, which is composed of great sandstone blocks, tilted towards the east. The borders of the plateaus are deeply intersected by dry "wadies" which sometimes carry water after heavy showers. The oases are entirely dependent on the ground water in the depressions. Many oases show evidence of decay, partly due to destruction by hostile invaders, partly to increasing dryness. The settled population is restricted to these oases, Nedjid and Hasa. The houses are built of clay, with flat roofs, very rudely made. Agriculture is limited to the growing of date palms, wheat and barley. Irrigation is necessary. Goats and sheep are common, a hump-backed zebu cow is rarely met with. All communication is carried on by camels and donkeys. There is practically no industry in central Arabia, and the export is limited to raw hides and wool.

The nomadic tribes spend the dry summer in the neighborhood of some wells; during the winter the steppes offer a scanty pasturage, and their flocks—sheep, goats and camels—then sweep over vast areas.

Eastern Arabia is divided in four political divisions, the Turkish province El-Hasa and the independent "states," Hail, Riadh, and Koweit. Riadh is the capital of the "imam" of the Wahhabitues. Koweit, at the head of the Persian Gulf, is the principal port of all central Arabia. It is closely allied to England, which thus commands the terminus of the Bagdad railway.

Mr. Raunkjær suffered many hardships and severe illness; and several times only just escaped being killed by fanatics. We must admire the stubborn perseverance that enabled him to force his way through this inhospitable desert, and to do scientific work also, greatly extending our knowledge of this part of the world, under very unfavorable conditions. The expedition was organized by The Royal Danish Geographical Society. W. WERENSKIÖLD.

AUSTRALASIA AND OCEANIA

The New World of the South: Australia in the Making. By W. H. Fitchett. xiv and 402 pp. Index. Charles Scribner's Sons, New York, 1913. \$1.75. 8 x 5.

Australia was placed on ancient maps long before it was actually discovered, or any ship had sailed the waters of the Pacific. And so, starting with these maps and the theories on which they were based, Mr. Fitchett begins his narrative. He continues down through the history of the discovery

and early exploration of the coast of Australia; the early settlement of the continent; the system of transportation of convicts from England; convict risings against the government; the political revolution; the cruel war between the whites and blacks of Tasmania and how Robinson, a Christian bricklayer, alone, through friendship, brought in the native tribes in surrender after 5,000 armed whites had toiled in vain to accomplish this end; the exploration of the interior of Australia; and, lastly, an account of the bushranger, a picturesque but bloody type of bandit. Throughout the book the character of each of the men, whether prominent in exploration, government or brigandage, is brought out clearly and distinctly. The author writes in a fascinating manner. There is not a dull or stupid page in the book.

WILBUR GREELEY BURROUGHS.

EUROPE

The Continent of Europe. By Lionel W. Lyde. xv and 446 pp. Maps, index. The Macmillan Co., New York & London, 1913. \$2. 9 x 5½.

There are few books in English in which the control or influence exerted upon man and his enterprises by geographical relief, climate and other natural factors is so emphasized on every page as in this volume. Professor Lyde has for some fifteen years been a conspicuous writer of texts and books on geographical education. The present volume associates with facts their full geographical significance. It deserves a place in the libraries of all teachers of our study, not only for its explication of the geography of the continent and states of Europe but also as an example of fine geographical method.

Die Lage der Deutschen Grossstädte. Von Dr. Albrecht Penck. 38 pp. *Städtebauliche Vorträge aus dem Seminar für Städtebau an der kgl. tech. Hochschule zu Berlin*, Vol. 5, No. 5. W. Ernst & Sohn, Berlin, 1912. Mk. 2.

In the development of German cities, location plays an important part in two ways. The first is the "Ortslage" or local situation inviting or repelling settlement; the second, the "geographische Lage," geographical location. Local conditions making a favorable *Ortslage* are, for example, a bluff on a navigable river (Cologne, Magdeburg); islands that make a river easily fordable (Berlin, Frankfurt); the mouth of a tributary (Coblenz, Ratisbon), and the like. The "geographical" location comprises the influence of the wider neighborhood, which determines whether many people are likely to be attracted to such a locally favored spot; as, for instance, location on an important line of traffic, or near mineral resources, or other natural advantages. While the *Ortslage*, in most cases, furnished the stimulus for the founding of towns, it was geographical location which decided whether such a foundation was to become a metropolis or remain a small town, and also whether, having once been large, it should remain so always.

From this point of view the author presents to us a very interesting synopsis of the rise and decline of the most important German towns under the influences of local and geographical location. The many old and famous cities on the Rhine were founded as Roman *castra*, wherever there was a good *Ortslage*, by virtue of their geographical location on the left bank of the Rhine, in order to control the conquered territory beyond the river. But later, when the Rhine became a German river, with almost all of Germany east of it, that geographical location ceased to be favorable, and newer cities sprang up on the right bank, often directly opposite the old ones, to compete with them. Only those of the older cities continued to grow, which, in addition to their former advantage, possessed also another whose value began to show under the changed conditions: Cologne, for example, because it is located where the great continental road along the foot of the German Mittelgebirge crosses the Rhine, while Mainz saw her leading position wrested from her by Frankfurt. The great ports of Germany (with the sole exception of Kiel) grew up at the head of ocean navigation on the large rivers, which was the favorable geographical location at the time of their foundation; but now the

favorable location is nearest the coast, so that on all these rivers new ports were built at their mouths creating a strong competition for the older places. In some cases, of which Hamburg is the most striking, permanency of location of large centers may be preserved. In other words, when a city, especially a commercial city, has grown to a certain size, too much capital is invested there to allow matters to go the natural way, so that every effort is made, regardless of cost, to preserve the former rank of the city. Hamburg spent millions on deepening and enlarging her harbor, so that now she has again reduced Cuxhaven to a port of secondary importance. Similarly, Leipzig, when Halle threatened to develop dangerous competition owing to changed political conditions, made the most strenuous efforts to revive her earlier supremacy, and succeeded.

In other cases, where the older city is not strong enough, such a struggle results in the creation of twin cities, such as Bremerhaven and Bremen, Heidelberg and Mannheim. A geographical location which may be called artificial is given whenever the will of a sovereign interferes with the purely geographical conditions. Thus Augsburg and Munich, both controlling important passes across the Alps, were rivals of equal importance all through the Middle Ages, until the rulers of Bavaria made Munich their capital, whereupon it quickly outstripped the sister city. Berlin and Magdeburg are another instance of the same thing. However, if the choice of the ruler is against nature, he will find nature stronger than his will, as was shown in the case of Ludwigsburg *versus* Stuttgart, where the old residence got the better of her new rival.

These few examples must suffice to show the method and points of view of the author, and also to show how interesting the "geography of places" can be when treated in a truly geographical way.

M. K. GENTHE.

Germany of To-Day. By Charles Tower. Home University Library. 256 pp. Index. Henry Holt & Co., New York. 50 cents. 7 x 4½.

An unusual exposition of the present status of the German Empire. The early chapters are political in their aspect dealing with the functions and machinery of the Empire and the municipalities. A few chapters consider the aspects of education, the social and intellectual life, with fresh and vigorous treatment. The industrial life of the Empire is treated in two significant chapters, one on manufacturing, the second on agriculture, and together they give the crux of the German situation as it stands to-day. The author brings out well the great increase of manufacturing which is largely a recent development and the rapid decline of agriculture from 80 per cent. of the population at the beginning of the nineteenth century to less than 30 per cent. to-day. The book is to be highly recommended to those who desire a knowledge of the German Empire.

ROBERT M. BROWN.

L'Espagne au XXe Siècle. Étude Politique et Économique. Par Angel Marvaud. xiv and 515 pp. Map. Armand Colin, Paris, 1913. Fr. 5. 8 x 5.

Commercial and economic geography is emphasized in this book. Many statistics are given, but as the author constantly insists upon deficiencies in Spanish statistical work, many of his conclusions might be taken with misgivings. He not infrequently contradicts himself and his general attitude towards his subject is that of a Frenchman and critic. Nothing is good in the unfortunate country; not even the climate finds grace. True it is that Spain is not exactly a paradise. The author's characterization of climate and soil as "arid" and not uniformly fertile is unfortunately true. As he says, the coast is not inviting to navigation and the largest streams partake of the nature of torrents rather than of rivers. With such natural drawbacks it is not easy for a people when emerging from nearly eight centuries of foreign rule and four centuries almost without peace to achieve, rapidly, material progress. This should be taken into consideration. Encouragement, not gloom, must be offered Spain, recognition of its efforts to remedy the errors of its past and to improve, even if timidly, the advantages of the present.

Mr. Marvaud signals every effort made in Spain for improvement but never fails to conclude that these efforts are hopeless. The only possibility he

sees for the salvation of the Spanish people is in education. This everybody will concede, and he himself acknowledges that much has been done lately in that direction. But such attempts require time, and there is no reason to despair of ultimate success because a few decades have not yet placed Spain, in this respect, on a level with other countries. The disheartening pessimism pervading the whole book may perhaps be partly explained by Spanish lack of sympathy for France, of which the author complains, although recognizing that the Spanish people are not wholly unjustified in their attitude.

AD. F. BANDELIER.

POLAR

Deutsche Südpolar-Expedition 1901-03 (Drygalski). Band 3 und 4: Meteorologie. Vol. 1, 1. Hälfte, No. 1: Meteorologische Ergebnisse der Winterstation des *Gauss*. Von W. Meinardus, pp. 1-126; No. 2, pp. 127-339. 2. Hälfte, No. 1: Das Beobachtungsmaterial und seine Verwertung nebst Erläuterungen zum meteorologischen Atlas. Von W. Meinardus und L. Mecking. Die Luftdruckverhältnisse und ihre klimatischen Folgen in der Atlantisch-Pazifischen Zone südlich von 30° S. Br. 129 pp. Vol. 2, No. 1: Meteorologische Ergebnisse der Winterstation des *Gauss* 1902-03. (Tabellen). Von W. Meinardus, pp. 1-123. No. 2: Meteorologische Ergebnisse der Kerguelen-Station 1902-03 (Tabellen), pp. 127-242. No. 3: Meteorologische Ergebnisse der Seefahrt des *Gauss* 1901-03 und Ergebnisse der Luftdruckbeobachtungen der Internationalen Meteorologischen Kooperation 1901-04 (Tabellen), pp. 245-452. 1. Atlas Meteorologie, No. 1: Mittlere Isobarenkarten der höheren südlichen Breiten von Oktober 1901 bis März 1904. Diagrams and maps. G. Reimer, Berlin, 1909, 1911, 1913. 14 x 11½.

The memoir of W. Meinardus is an elaborate discussion of the meteorological observations made by the German Antarctic Expedition. Numerous comparisons with observations made by other South Polar expeditions, and the great care with which all details were studied, led Meinardus to many interesting results. A simple enumeration of the problems discussed would occupy many pages. Meinardus has treated his subject with a master hand. Only in a few instances does one feel inclined to criticise his statements. An interesting part of the report is Meinardus's interpretation of the general atmospheric circulation in the South Polar regions.

The memoir of L. Mecking deals with the distribution of atmospheric pressure south of 30° S. and the influence of seasonal barometric changes upon the Antarctic meteorological phenomena. The material upon which Mecking's discussion is based was gathered by international cooperation during the years 1901-1904. Those who attended the Geographical Congress of Berlin in 1899 and remember the discussions and especially Sir Clements Markham's speech, will understand why this "international cooperation" was predestined to be unsatisfactory.

G. Neumayer, who played such a predominant rôle in the organization of the famous polar cooperation of 1882-83, after having worked for years in favor of a German Antarctic Expedition, naturally wished, first of all, for a scientifically important and a geographically successful "German" expedition.

In Sir Clement's mind the "English" expedition had to solve all the problems and he simply condescended therefore to have the South Polar regions divided into two spheres of action: the British and the German. It was by pure courtesy that other expeditions, the Bruce, the Charcot and the Nordenskjöld, had been admitted to cooperate. Such a state of mind could evidently lead only to some misunderstandings, of which whoever is accustomed to read between the lines will find a few words of explanation on p. 13 of the report of Meinardus and Mecking.

In fact, it is only now that one can show, with the aid of the daily maps published by the Royal Society and the monthly maps published by Mecking, how much more could easily have been gained if extensive international cooperation, similar to the Arctic cooperation of 1882-83, had been attempted.

In preparing maps of atmospheric pressure for Oct., 1900, to March, 1904, Mecking introduced principally observations made on board ships. He disposed of approximately 600,000 individual observations. Then, of course, the observations made in Argentina, Chile, Cape Colony, Australia and New Zealand as well as the simultaneous observations of the German Antarctic Expedition were utilized. He divided the observations made at sea into quadrangles and deduced the monthly means. In most cases his isobars do not go farther than 50°S., except south of Cape Horn where the necessary connection with the data of the Antarctic stations could easily be obtained. The immediate result of this closer connection was the discovery of two important centers of action of atmospheric circulation, situated one over Belgica Sea, the other over Weddell Sea. From the discussion it is evident that these centers of action play as important a rôle in Antarctic and South American meteorology as the Icelandic and Northern Pacific centers of action upon the weather conditions of North America and Western Europe.

Mecking's discussion is most suggestive and the principal conclusion to be drawn from his very minute and far-reaching study is certainly that we can not be satisfied with such imperfect polar cooperative work as that done during 1901-1904. Meinardus and Mecking, in this monumental meteorological work, have not restricted themselves to well-established facts, but have had the courage to advance into the field of working hypotheses, opening at the same time the way to new researches and to new discoveries.

HENRYK ARCTOWSKI.

THE WORLD AND PARTS OF IT

In der Tropenwelt. Von Dr. Carl Holtermann. v and 210 pp. Ills., index. W. Engelmann, Leipzig, 1912. Mk. 5.80. 9½ x 6½.

This book treats, very adequately for the general reader, the most representative features of tropical vegetation and the conditions under which the floras develop. In the section on the mangrove, for example, the influence of tropical sea water upon the development of this form of vegetation is sketched. The epiphytes, palms, desert plants, tropical alpine growths, tropical fruits, condiments, tea, coffee, rice, opium and hashish are most prominent among the plants discussed.

PHYSICAL GEOGRAPHY

Zur Geschichte und Theorie des Vulkanismus. Von Dr. Karl Schneider. 113 pp. J. G. Calve, Prag, 1908. 10 x 7.

A good reference work on the history of volcanism. In the first part the author characterizes the theories held by various scientists: Varenus, Kircher, v. Buch, v. Humboldt, Poulett-Scrope, Lyell, Naumann, Suess, Branco, Geikie, Stübel, and others; in the second he develops his own opinions on the subject. Taking the interior of the earth as a solid but plastic mass, which a lessening of pressure may change into a liquid or gaseous condition, every disturbance of the equilibrium subsequent to variations of the density of the crust or of the intensity of gravity in the latter must produce a readjustment of the masses which allows the magma to penetrate to the surface. Hence volcanism always appears in connection with tectonic changes, but neither as the cause nor the effect of them, and is most frequent between the tropics because there the centrifugal tendency of the magma is strengthened by that of the equatorial parts of the globe.

Three phases can be distinguished in the character of the eruptions of any volcanic region, which, while sometimes overlapping, regularly succeed one another: the ejection of lava, of ashes (tufa) and of gas. Illustrating these phases by means of examples from Iceland, Italy and the central plateau of France, the author shows that in our present geological period the second phase predominates, with a few relapses into the first (Iceland, Hawaii) and some anticipations of the third (Mt. Pelé). These changes of volcanic intensity are due to the nutation of the earth's axis which disturbs the equilibrium of the masses both in the interior and the crust.

M. K. GENTHE.

ECONOMIC AND COMMERCIAL GEOGRAPHY

The Trade of the World. By James D. Whelpley. 436 pp. Ills., index. The Century Co., New York, 1913. \$2. 8½ x 6.

This small volume discusses in convincing style the factors which have been successful in the world's trade and emphasizes the idea that the success which comes to any nation in its struggle for a part of the world's markets rests on something more than a surplus of commodities. Common sense, an appreciation of the people who barter and courage are some of the talents which lead to successful commerce.

An intimate exposition of the position and policy of the leading commercial nations, Great Britain, Germany, France, and others, fill most of the book and a short chapter on the foreign trade of the United States concludes it. While to the States are allotted only thirty-five pages, still the entire book, in a sense, relates to the trade policy of the home land, as constant comparison of the various nations and the United States runs through the volume. There is no better way to give our merchants a fuller appreciation of the necessities of the situation than to show how anxiously foreign sellers study the desires and even whims of their buyers. In some ways we excel the merchants of other lands; in others we are indifferent, and in still others a stable or acceptable policy is altogether wanting. A broad view of the diplomatic service of the United States, which urges that a consul should be thoroughly familiar with the needs of the country to which he is sent in order that he may report upon not only the field but also the peculiar demands of customers, seems to the author a most valuable adjunct to our trade policy.

ROBERT M. BROWN.

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CONQUEST AND COLONISATION IN NORTH AFRICA. Being the Substance of a Series of Letters from Algeria published in the "Times," and now by Permission Collected, with Introduction and Supplement, containing the most recent French and other information on Morocco. By Geo. Wingrove Cooke. xvii and 246 pp. Map. W. Blackwood & Sons, Edinburgh, 1860. 7½ x 5.

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[Covers part of the territory shown on Charts Nos. 122 and 123 on the same scale.]

Philippine Islands. (a) Philippine Islands: Southeastern Part. [Mean scale, 1:800,000]. 10°45' - 5°10' N.; 121°10' - 127°5' E. 2 colors. Chart No. 4708. Nov. 1913. 50 cts.

(b) Harbors on Burias and Ticao Islands and Ragay Gulf. [Seven maps, all 1 color:] (1) Port Busainga, Northeast Coast of Burias. From Spanish survey in 1841. 1:15,000. 13°8' N. and 123°3' E. (2) San Jacinto, East Coast of Ticao. From Italian survey in 1884. 1:20,000. 12°34' N. and 123°44' E. (3) Port Boea Engaño, East Coast of Burias. From Spanish survey in 1893. 1:10,000. 12°47' N. and 123°19' E. (4) Port San Miguel, Northwest Coast of Ticao. From a Spanish survey in 1892. 1:30,000. 12°40' N. and 123°35' E. (5) Port Pusgo, Ragay Gulf, Luzon. Surveyed in 1912. 1:30,000. 13°34.3' - 13°28.5' N.; 122°32.5' - 122°39.2' E. (6) Pasacao Anchorage, Ragay Gulf, Luzon. Surveyed in 1912. 1:20,000. 13°30' N. and 123°3' E. (7) Port Busin, North Coast of Burias. Surveyed in 1912. 1:20,000.

* Only new charts are listed, not new editions of old charts.

13°10.0' - 13°7.0' N.; 122°55.7' - 122°59.4' E. Chart No. 4454. Jan. 1914. 30 cts.

[Chart No. 4708 is a general map including the whole of Mindanao.]

Rhode Island. Point Judith Harbor of Refuge. 1:10,000. 41°22.8' - 41°20.4' N.; 71°31.5' - 71°28.2' W. 1 color. Chart No. 275. Dec. 1913. 30 cts.

NORTH AMERICA

UNITED STATES

United States. United States. 1:25,000,000. [Two maps:] (1) Mean Annual Precipitation. From map prepared by Henry Gannett, mainly from data of U. S. Weather Bureau, and published in U. S. G. S. Water Supply Paper 234, 1909. 7 colors. (2) Vegetation. Simplified from the Oxford Wall Map (compiled by Dr. M. Hardy and published 1909). 11 colors. Accompany "Impressions of the Vegetation of the United States of America (The American Transcontinental Excursion of 1912: III)" by A. G. Ogilvie, *Geogr. Journ.*, Vol. 42, 1913, No. 4, pp. 342-360.

[On map (1) seven rainfall grades are shown. On map (2) the following eleven vegetational formations are distinguished: (1) desert, (2) sage brush, (3) scrub (chaparral), (4) steppe, (5) park steppe, (6) taiga, (7) western coniferous forest, (8) mixed temperate forest, (9) warm temperate forest, (10) Gulf and Atlantic coastal forest, (11) hot wet forest. On both maps the route of this Society's Transcontinental Excursion is shown.]

Wyoming, etc. Yellowstone National Park showing Relief, Main Rivers and Lakes (From the U. S. G. S. Topographic Map). 1:750,000. [45°2' - 44°9' N.; 118°8' - 110°0']. Accompanies, on p. 339, "The United States National Parks (The American Transcontinental Excursion of 1912: II)" by H. O. Beckit, *Geogr. Journ.*, Vol. 42, 1913, No. 4, pp. 333-342.

[Helpful mainly in bringing out the relief by hypsometric tints.]

ASIA

China. Sketch Map Showing the route followed by F. Kingdon Ward, B.A., across the Chung-Tien Plateau, Yunnan, 1913. 1:1,250,000. 28°35' - 26°40' N.; 48°49' - 100°20' E. With inset of southeastern Asia, 1:70,000,000, showing location of main map. Accompanies, on p. 463, "Across the Chung-Tien Plateau" by F. Kingdon Ward, *Geogr. Journ.*, Vol. 42, 1913, No. 5, pp. 461-466.

[Route lay obliquely across the region between the upper constricted courses of the Yang-tze-kiang and Mekong Rivers at an altitude of 10,000 to 11,000 ft.]

Persia. Sketch Map to illustrate the journey of H. L. Rabino from Resht to Sari, 1908 and 1909. 1:1,750,000. 37°45' - 36°0' N.; 49°30' - 53°12' E. Accompanies, on p. 439, "A Journey in Mazanderan (from Resht to Sari)" by H. L. Rabino, *Geogr. Journ.*, Vol. 42, 1913, No. 5, pp. 435-454.

[Note on the map says that it is based on J. de Morgan's "Carte des Rives Méridionales de la Mer Caspienne."]

AUSTRALASIA AND OCEANIA

Kaiser Wilhelms Land. Die erste Ersteigung der Hochgebirgsgipfel im Hinterlande von Finschhafen (Deutsch-Neuguinea). Nach Aufnahmen von Missionar Chr. Keysser konstruiert von C. Schmidt. 1:300,000. 6°10' - 6°40' S.; 146°52' - 147°50' E. 2 colors. Accompanies, as Taf. 32, "Die erste Ersteigung der östlichen Gipfel des Finsterbergegebirges (Kaiser-Wilhelms-Land)" by C. Keysser, *Petermanns Mitt.*, Vol. 59, II, 1913, Oct., pp. 177-181.

EUROPE

Russia. Commercial and Industrial Map of European Russia. Based on statistical data for 1900 with regard to the commercial and industrial move-

ment and on many other geographical and economic-statistical sources. Compiled by B. P. Semenov-Tian Shanski. 1:1,680,000. 71°-38° N.; 16°-68° E. 98 colors. With 10 insets showing certain regions in greater detail, 16 insets showing the value of the trades and industries of Russia and 2 insets showing its division into commercial and industrial regions, as follows: I (all on the scale of 1:420,000, except 9 and 10, and in various colors): (1) [St. Petersburg and vicinity.] (2) [Polish-Silesian-Galician coal region.] (3) [Lodz and vicinity.] (4) [Konskie, Poland, and vicinity.] (5) [Warsaw and vicinity.] (6) [Kutno, Poland, and vicinity.] (7) [Ostrovietz, Poland, and vicinity.] (8) [Region to the west of Warsaw.] (9) [Dонец coal and iron region.] [1:630,000]. (10) [Moscow industrial region.] [1:630,000.] II: [Sixteen inset maps of Russia, 1:23,000,000, in various colors, with the general title:] Intensity of Separate Trade and Industrial Types: Annual Movement in Roubles per Capita [divided into two categories, (a) the trade in, and (b) the manufacture of the articles mentioned, viz.:] (a) (1) general intensity of trade, (2) agricultural vegetational products, (3) products of stock-raising, of fisheries and hunting, (4) forest materials and lumber products, (5) mineral products and metal manufactures, (6) manufactures and fancy goods, (7) wine and spirits, (8) miscellaneous; (b) (1) general intensity of manufacturing, (2) food products, (3) animal products not used for food, (4) lumber and wood products, (5) useful minerals and products thereof, (6) textile products, (7) chemical products, (8) various mechanical trades, handicrafts and workmen's associations. III. (1) General Outline of Commercial and Industrial Regions. [1:2,300,000]. 13 colors. (2) General Outline of the Groups and Sub-Groups of the Regions. [1:11,000,000]. — In 9 sheets. Supplement to the work "Commerce and Industry of European Russia in 1900 by Regions," 13 vols., Ministry of Commerce and Industry, St. Petersburg, 1903-1911. [In Russian.]

[A highly important map which represents with great minuteness the economic regions of European Russia. The country is divided into no less than 1,065 economic units, based on the nature and value of their trade and manufactures. These 1,065 units are grouped together into 75 economic provinces (shown on inset III₂), these again into 12 major economic regions (inset III₁). These 12 regions are: (1) Northern Forest Region, (2) Northwestern Agricultural Region, (3) Moscow Industrial Region, (4) Central Cereal Region, (5) Ural Region, (6) Southeastern Stock Raising and Fishery Region, (7) Cis-Caucasian Region, (8) Southern Cereal Region, (9) Southern Mining Region, (10) Southwestern Agricultural and Industrial Region, (11) Polesie Region, (12) Vistula Region (*i. e.* Poland). Each of the 1,065 units is shown in a distinct color which expresses both the type and the value of its economic activities. Six types each are established for trade and manufacturing: these correspond respectively to the titles of the inset maps listed above under II and numbered (a) 2-7 and (b) 2-7. Each type is further subdivided into seven grades according to the value of the products in roubles per capita. All of these differentiations—a total of 84—are brought out clearly by the color scheme, each type being represented by a suggestive color group (as green for forest products) which is composed of tints of varying strength to express the value grades. Identification is facilitated by assigning a letter to each tint. In addition, towns are similarly differentiated, by means of 8 kinds of circles, according to the value of their output, and the nature of their products is shown by the corresponding coloring of the sectors into which these circles are proportionately divided. The nature and value, in 1900, of the economic activities of any district or town of Russia may thus be seen at a glance. For instance, the region about Archangelsk on the White Sea is seen mainly to have produced lumber to the value of 100-500 roubles per inhabitant, while the town itself had a trade valued at 5,000,000-10,000,000 roubles, divided into four equal parts, *viz.*, in lumber, agricultural products, fisheries and alcoholic beverages. The map is a veritable mine of information and is an admirable example of the synoptical value of the graphical (*i. e.*, in geographical terms, cartographical) method of presentation, for it contains the greater part of the material laid down in the 13 volumes which it accompanies. Its editorship is a guarantee of geographical treatment throughout: this is very evident in the establishment of

the economic regions themselves, which are not based on administrative units but on the natural limits of the economic activities which they represent (cf. *Diario N. 3: X Congresso Geografico Internazionale*, Rome [session of March 28, 1913], p. 4, and Vol. 13 (General Part) of the work cited above, which is accompanied by a map, 1:6,300,000, showing the subdivision into economic districts down to each of the 1,065 units, on which the units are, however, not very accurately reduced from the original map.)]

Russia. Handel und Industrie im Europäischen Russland. Von Benjamin v. Semenow-Tian-Schanský. Nach der Originalkarte 1:1,680,000 reduziert. 1:7,500,000. 74°-40° N.; 5°-75° E. 32 colors. Accompanies, as Taf. 36, "Handel und Industrie im Europäischen Russland" by A. Woeikow, *Petermanns Mitt.*, Vol. 59, II, 1913, Oct., pp. 194-195.

[A reduction of the important map listed immediately above. The 84 differentiations in type and value of trade on the original map have been reduced to 27, however (3 value grades for each of the 9 types shown), and the number of economic units shown is conditioned by this reduction in the range of expression and is therefore considerably simplified. The names of the 12 regions and the 75 provinces into which they fall are given at the bottom of the map. The color scheme of the original has, in general, been followed. Some slips are noticeable in the color printing: thus the economic units north of Wyasniki (to use the German transliteration) in region 21 and east of Sergatsch in region 30 are shown in green stippling, for which there is no equivalent in the color key, while various units are practically left without color, probably through the defaulting of certain plates, as the units east of Suwalki (region 15), north of Brest Litowsk (region 73), south of Kaluga (region 28), and south of Tschistopol (region 37); while the lakes in the westernmost division of region 2 are colored instead of being left white. These may seem minute criticisms, and they would be so did one not have reason to expect high standards in color printing from the firm of Justus Perthes. These are minor considerations, however, as compared with the debt the western geographical world owes to the editor of *Petermanns Mitteilungen* for making more readily accessible to it this *magnum opus* in the domain of Russian economic geography.]

POLAR

Greenland. Sketch showing Approximate Routes of Recent Travellers across Greenland, 1912-13. 1:15,000,000. 85°-59° N.; 90° W.-10° E. Accompanies, on p. 547, "Recent Crossings of Greenland," *Geogr. Journ.*, Vol. 42, 1913, No. 6, pp. 545-550.

[Shows routes of Rasmussen, 1912, Koch, 1913, De Quervain, 1912; also of Peary, 1892 and 1893-95, and Nansen, 1888.]

WORLD AND LARGER PARTS

Southern Pacific and Indian Oceans. Preliminary Chart showing the Deep Sea Soundings taken on board the "Aurora" during the 1st and 2nd years' work of the Australasian Antarctic Expedition under Dr. Douglas Mawson, 1912-13. 1:15,000,000. 35°-75° S.; 80°-180° E. 1 color. Accompanies "The Soundings of the Antarctic Ship 'Aurora' between Tasmania and the Antarctic Continent (1912)" by J. K. Davis and "Notes on the Antarctic Soundings of the 'Aurora'" by J. Murray, *Geogr. Journ.*, Vol. 42, 1913, No. 4, pp. 361-364, together.

[Valuable expansion of the sketch map previously published in the *Geogr. Journ.* (see, under same heading, *Bull.*, Vol. 45, 1913, p. 799). The edge of the continental shelf, off Adélie Land, is shown to lie about 100 miles off the coast, while between here and Tasmania the soundings average 2,000 fathoms, except for the submarine elevation in 47° S. and 148° E. already shown on the earlier sketch map. The soundings between Adélie Land and Tasmania practically lie on what, since the elimination of the "Antarctic Ocean" due to the establishment of the Antarctic Continent, is now generally accepted, after

Krümmel, as the boundary between the Indian and Pacific Oceans (meridian of southern end of Tasmania: 147° E.) The map also shows the coastal portions of the Antarctic Continent recently discovered by the Australasian Antarctic Expedition, *viz.*, Queen Mary Land (95° E.) adjoining Kaiser Wilhelm II Land to the east, snow covered land 2,500 ft. high in 132° E., and King George V Land (148° E.) contiguous with Adélie Land on the east.]

World. Chart to illustrate a paper on the Magnetic Survey of the Oceans by Prof. L. A. Bauer. [Mercator's projection; equatorial scale 1:223,000,000.] Accompanies on p. 519, "The Magnetic Survey of the Oceans" by L. A. Bauer, *Geogr. Journ.*, Vol. 42, 1913, No. 6, pp. 517-530.

[Shows the track of the *Carnegie* and the stations on land where the magnetic elements have been determined by the Department of Terrestrial Magnetism of the Carnegie Institution.]

Other Maps Received

NORTH AMERICA

UNITED STATES

Idaho. Judge's Map of Idaho. Compiled from latest Government Surveys and other original sources and engraved by W. Elliott Judge, 24 California St., San Francisco, 1912. \$5.00.

New England. Map of the New England States, showing State, County and Town Boundaries, Post Offices, Railroad Stations, &c. 10 mi. to 1 in. Walker Lith. & Pub. Co., 400 Newburg St., Boston, Mass., 1909. 25 cts.

Utah. Judge's Map of Utah. Compiled from latest Government Surveys and other original sources and engraved by W. Elliott Judge, 24 California St., San Francisco, 1912. \$5.00.

SOUTH AMERICA

Argentina. República Argentina: Region Oeste de Buenos Aires, que comprende los campos de Oeste de la Provincia de la Pampa. Catastro de las Propiedades Rurales, nombre de las Estancias y Colonias, Vías ferreas y Caminos principales. 1:300,000. Construido con datos propios por el Agri-mensor Enrique Glade, Cangallo, 845, Buenos Aires, 1911.

Plano preliminar y parcial de los Territorios de Neuquen, Rio Negro, Chubut y Santa Cruz. Levantado por la Sección Topográfica del Museo y dibujado por la Sección Cartográfica del mismo, 1896. 1:600,000. Inset: Carta de Conjunto indicando la ubicación de la región detallada en el mapa parcial. 1:7,000,000. Museo de la Plata, [La Plata.]

AFRICA

Algeria. Nouveau plan d'Alger et de ses environs. 1:10,000. Librairie Garnier Frères, 6, Rue des Saints-Pères, Paris.

Plan d'Oran et ses environs. 1:8,000. Inset: Environs d'Oran, 1:800,000. Librairie Garnier Frères, 6, Rue des Saints-Pères, Paris.

Egypt. Postal Map of Lower Egypt. 1:250,000. Insets: Cairo, 1:75,000; Maritime Line, Suez to Tor, 1:2,000,000; Offices in Alexandria, 1:50,000. Survey Department, Cairo, 1906.

EUROPE

Austria. G. Freytags Touristen-Wanderkarte. Blatt IV, Hochschwab; Bl. VII, Wachau; Bl. VIII, Östl. Salzkammergut; Bl. IX, Westl. Salzkammergut; Bl. X, Berchtesgadenerland und Pinzgau; Bl. XI, Südl. Waldviertel mit dem Donautale; Bl. XII, Hohe Tauern; Bl. XIV, Julische Alpen und Karawanken. 1:100,000. Kartogr. Anstalt G. Freytag & Berndt. Wien. K. 4 each.

Austria-Hungary. Flemmings namentreue (idionomatographische) Länderkarten: Blatt 4, Karte von Österreich-Ungarn. 1:1,500,000. Insets of Budapest, Triest and Wien, 1:200,000; Austria-Hungary, 1:15,000,000. Herausgegeben von Prof. Dr. A. Bludau und Otto Herkt. Carl Flemming, Verlag, A. G., Berlin W. und Glogau. M. 3.50.

Balkan Peninsula. H. Kiepert's Generalkarte der Südost-Europäischen Halbinsel. 1:1,500,000. Insets: Der Hellespont oder die Dardanellen Strasse mit der Halbinsel von Gallipoli und der Troischen Ebene, 1:300,000; Constantinopel und der Bosphorus, 1:200,000. Lithogr. u. Druck v. Dietrich Reimer (Ernst Vohsen), Berlin, 1912.

France. Carte Campbell—"Environs de Paris" avec Plans et Monuments, extrait de "La France" en 15 Régions. Dressée d'après les documents les plus récents à l'échelle de 1:320,000. With 29 insets of French cities. Ed. Blondel La Rougery, Éditeur, 7, Rue Saint-Lazare, Paris. 1 fr.

Environs de Cannes, Nice et Menton. 1:80,000. Insets [1:40,000]: Environs de Menton; Environs de Nice. Librairie Garnier Frères, 6, Rue des Saints-Pères, Paris.

Plan de Nice et ses environs. 1:9,260. Inset: Plan de Cannes et de ses environs à l'échelle de 1:28,570. Librairie Garnier Frères, Paris. 1 fr.

Plan de Menton et ses environs. 1:9,500. Insets: Menton à l'échelle de 1:4,700; [Mediterranean coast from Pte. de la Calle to Bordighera], 1:400,000. Librairie Garnier Frères, Paris. 1 fr.

Nouveau Plan de la Ville de Lyon et ses Faubourgs. 1:12,500. Librairie Garnier Frères, Paris.

Plan de Toulon et ses environs. 1:4,000. Inset: Environs de Toulon, 1:11,500. Librairie Garnier Frères, Paris.

Germany. G. Freytags Automobil- und Radfahrererkarten: Blatt 7, Münster. 1:300,000. Verlag u. Druck der Kartogr. Anstalt G. Freytag u. Berndt, Wien u. Leipzig. Mk. 1.70.

Geognostische Karte des Königreichs Bayern. Fünfte Abteilung: Die Bayerische Rheinpfalz. Drittes Blatt: Kusel. Mit einem Hefte Erläuterungen. Im dienstlichen Auftrage ausgearbeitet durch die Geognostische Abteilung des Königl. Bayerischen Oberbergamtes unter der Leitung von Dr. Ludwig von Ammon. Verlag von Piloty & Loehle, München, 1909.

Greece. Karte von Griechenland zur Zeit des Pausanias bearbeitet von Universitätsprofessor H. Blümmer, Zürich. 1:500,000. Geographischer Karten-Verlag Bern u. Leipzig, Kümmerly & Frey u. A. Francke. [1911].

Italy. Carta economica industriale della Provincia di Mantova alla scala di 1:100,000. Inset: Città di Mantova, 1:10,000. Pubblicata per cura della Camera di Commercio di Mantova, 1909.

Carta amministrativa stradale della Provincia di Torino, 1:250,000. Istituto Geografico de Agostini, Novara. Lire 1.20.

The Netherlands. Postkaart van Nederland. 1:250,000. Ministry of Posts, The Hague.

Switzerland. H. Kümmerly: Gesamtkarte der Schweiz. 1:400,000. Geogr. artist. Anst. Kümmerly & Frey, Bern. Fr. 4.50.

Spezialkarte des Exkursionsgebietes von Bern. 1:75,000. Herausgegeben unter Mitwirkung des Verkehrs-Verein Bern. Bearbeitet von H. Kümmerly & Frey, Geogr. artist. Anstalt, Bern, 1908. Fr. 3.

Switzerland-Germany. Professor W. Liebenow's Rad- und Automobilkarte der Nordwestschweiz und von Südwestdeutschland. Verlag von Wepf, Schwabe & Co., Basel. Stich und Druck der geograph. Anstalt von Ludwig Ravenstein, Frankfurt a. M. Fr. 3.

WORLD AND LARGER PARTS

Egypt-Turkey in Asia. Égypte, Palestine-Syrie: Carte politique et historique. 1:2,200,000. Insets: Chemins de fer de l'Égypte; Environs du

Caire; Jérusalem, Hébron-Jéricho & La Mer Morte; Environs de Jérusalem; Environs d'Alexandrie. Librairie Garnier Frères, 6, Rue des Saints-Pères, Paris. 2 fr.

Russian Empire. (a) Map of Post Routes of the Russian Empire, 1913. (b) Telegraph Map of the Russian Empire, 1910. With insets: St. Petersburg; Transcaspia; Kamchatka. 35 versts to the inch. (c) Postal-Telegraph Map of the Russian Empire, 1912. 35 versts to the inch. With insets: Asiatic Russia, 200 versts to the inch; St. Petersburg, 10 versts to the inch. [In Russian.] Ministry of Posts and Telegraphs, St. Petersburg.

World. Rand, McNally & Co.'s New Travel Chart and Distance Table of the World. [Mercator's projection; equatorial scale, 1:85,000,000.] Rand, McNally & Co., New York, 1907.

ATLASES

Hammond's Descriptive Atlas of Panama and the Isthmian Canal. 16 pp. containing maps, ills. and descriptive text. C. S. Hammond & Co., New York, [1912]. 25 cents. $13\frac{1}{2} \times 10$ inches.

Bible Atlas (Non-Sectarian): Physical-Historical. By Townsend MacCoun. 121 plates of maps and 125 pp. of text. L. L. Poates Publishing Co., New York, 1912. \$1.50. $7 \times 4\frac{1}{2}$.

[The inclusion of numerous hypsometric maps (wax-engraved) in the physical section shows the right point of view: the "relief maps" (half-tone reproductions of wash drawings) are poor.]

Eisenbahn- und Verkehrs-Taschen-Atlas von Deutschland mit den anliegenden Grenzgebieten von Frankreich, Schweiz, Österreich, Russland, Belgien, Holland, Dänemark und Schweden. Nebst einem Stations- und Ortsverzeichnis von ca. 38,000 deutschen Orten. Massstab: 1:800,000. Verkleinerte Ausgabe aus Eisenbahn- und Verkehrs-Atlas von Europa (Abt. Deutschland) begründet von Dr. W. Koch und C. Opitz, herausgegeben von O. Opitz. Ausgabe 1912. xx, 260 pp., and 48 plates. J. J. Arnd, Leipzig. Mk. 4. 7×5 .

[Exhaustive railroad atlas of Germany differentiating minutely between the various kinds of lines and of stations.]

Hammond's Modern Atlas of the World. A New Series of Physical, Political and Historical Maps Compiled from Government Surveys and Exhibiting the Latest Results of Geographical Research, Accompanied by a Gazetteer of the Principal Towns of the World. 128 pp. of maps, 48 pp. of text and 8 pp. supplement on the Panama Canal. C. S. Hammond & Co., New York, 1911. $13\frac{1}{2} \times 10\frac{1}{2}$.

[Gaudy wax-engraved maps not always sustaining the claim of the pretentious sub-title.]

L. L. Poates & Co's. Complete Atlas of the World. Containing Maps of the United States, its 48 States, its Territories and its Insular possessions, together with all of the Canadian Provinces and every other country of the world. 193 pp. of maps and 32 pp. of text. L. L. Poates Publishing Co., New York [1912]. $9\frac{1}{2} \times 7$.

[Wax-engraved maps of somewhat more pleasing appearance than usual: relief in brown hachuring, railroads in red.]

The Standard Atlas and Chronological History of the World. Containing New Maps of all the States and Territories of the United States and Every Country in the World, including the Latest Census of the United States, together with an Entirely New Gazetteer of the Cities of the World, and a Comprehensive Review of the Machinery of the Federal Government [and a Chronological Table of Universal History]. Arranged by Charles Leonard-Stuart. 327 pp. (90 pp. of maps and 235 pp. of text). Syndicate Publishing Co., New York, 1912. \$1.50. $8\frac{1}{2} \times 7$.

[Usual type of wax-engraved maps, somewhat clearer than ordinarily.]